AUG 19 1916
UNIV. OF MICH. LIBRARY

Railway Age Gazette

SECOND HALF OF 1916—No. 7. SIXTY-FIRST YEAR

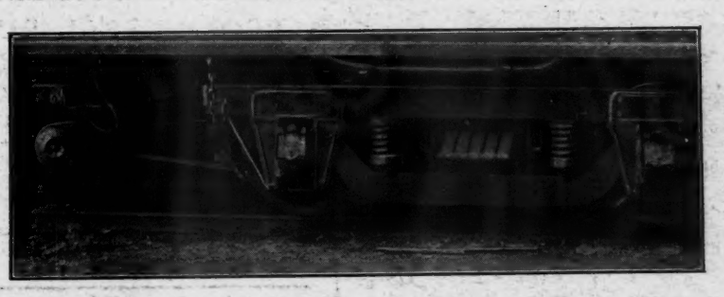
NEW YORK: Woolworth Building
CHICAGO: Transportation Building

NEW YORK—AUGUST 18, 1916—CHICAGO

CLEVELAND: Citizens Building
LONDON (England): Westminster

Ask the Man Who Operates It

"UNDER-FRAME"



Its service operation, reduction of weight and increased belt life have made it the economical standard axle-lighting system.

The Safety Car Heating & Lighting Co.

Chicago
Montreal
San Francisco

2 Rector Street, New York

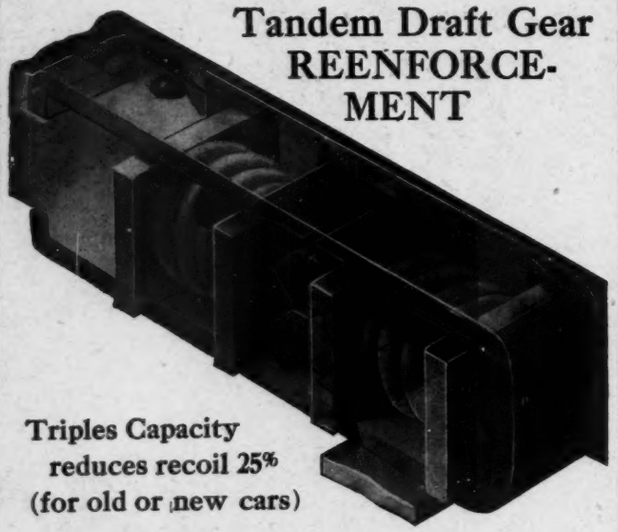
Philadelphia
St. Louis
Boston

Alphabetical Index to Advertisements, Page 5 · Classified Directory of Advertisers, Page 6

Universal

Cast Steel Drawbar Yokes
Draft Lugs
Cast Steel Draft Arms or Sills

Tandem Draft Gear REENFORCEMENT



Triples Capacity reduces recoil 25%
(for old or new cars)

Universal Draft Gear Attachment Co.
Railway Exchange Building CHICAGO

PANTASOTE

The National Standard for car curtains and car upholstery. Twenty years' service tests have established its superiority to any other curtain material.

AGASOTE

For car headlinings and interior trim. A homogeneous waterproof board of great density and tensile strength. It will not warp, blister or separate.

FIREPROOF AGASOTE

Non-conductive qualities of heat and cold make it peculiarly well adapted for headlining and interior trim for steel fireproof passenger cars, entirely eliminating the disadvantage of steel for interior trim and giving the appearance of wood finish.

THE PANTASOTE COMPANY

11 Broadway, New York Peoples Gas Building, Chicago
797 Monadnock Bldg., San Francisco

WILSON'S
STERILIZED
CURLED HAIR
"UPHOLSTERY DE LUXE"

UNEXCELLED FOR DURABLE, SANITARY UPHOLSTERY IN NEW CARS, OR IN THE REPAIRING OF OLD ROLLING STOCK

SAMPLES AND PRICES GLADLY FURNISHED

WILSON & CO.

4100 S. ASHLAND AVE. CHICAGO

SARCO MINERAL RUBBER ASPHALTS

SARCO No. 6 Waterproofing
SARCO Bituminous Putty
SARCO 5-M Paint
SARCO Refrigerator Compound
SARCO Mineral Rubber Floors
SARTAC-Damp-Proofing
SARCO R. S. A. Specifications
SARCO Roof Cement

SARCO PRODUCTS INSURE PURITY AND RELIABILITY

Promptness—Service—Efficiency

SARCO STANDARD ASPHALT & RUBBER CO. SARCO
CHICAGO, ILL.

DICKINSON DEVICES

Cast Iron Smoke Jacks
Light Fire-Proof Smoke Jacks
Ventilators All Materials
Cast Iron Chimneys
Cast Iron Buildings
Telephone Booths

PAUL DICKINSON Inc., 3346 South Artesian Ave., Chicago

GOLD CAR HEATING & LIGHTING CO.

ECONOMICAL—SYSTEMS OF MERIT—WILL NOT FREEZE

VAPOR SYSTEMS
PRESSURE SYSTEMS
VAPOR AND PRESSURE SYSTEMS
HOT WATER SYSTEMS
ELECTRIC SYSTEMS

AUTOMATIC HEAT CONTROL FOR ALL SYSTEMS—VENTILATORS
17 BATTERY PLACE, NEW YORK

CHASE GOAT BRAND PLUSHES AND CHASE IMITATION LEATHER

Quality standards are fixed and dependable

Several months ago a seat cover of Chase Plush was sent to us with the statement that it had been in continual service for twenty-four years.

L. C. CHASE & CO.

89 Franklin Street, BOSTON. 326 W. Madison Street, CHICAGO. 321 Fourth Avenue, NEW YORK. 303 Majestic Bldg., DETROIT.

Railway Age Gazette

Volume 61 August 18, 1916 No. 7

Table of Contents

EDITORIALS:
An Outside Point of View ... 269
The President, the Railroads and the Brotherhoods ... 269
Vanished Into Thin Air ... 269
Can a Railroad Profit by Psychology ... 270
State Discrimination Against Interstate Commerce ... 270
The Menace of a Bad Car Shortage ... 271

NEW BOOKS ... 271

LETTERS TO THE EDITOR:
Curtains for Crossings ... 272
Only the Rich Can Be Economical ... 272
Improving the Clerk's Opportunities ... 273
Concrete and Asphalt Roads to Promote Freight Traffic ... 274
To Keep Train Men Vigilant ... 274

MISCELLANEOUS:
*Erection Progress on the Quebec Bridge; A. J. Meyers ... 275
The Proposed Clearance Law ... 277
*A. B. Stickney ... 278
Efficiency Testing on the Pennsylvania ... 279
Is It to Be Co-operation in the Future; Paul H. King ... 283
Erie Railroad 50-Ton Capacity Hopper Car ... 285
*Interior Transverse Rail Fissures; P. H. Dudley ... 287
*Scientific Tests on Signal Interpretation; O. V. Fry ... 289
Construction of Steam and Electric Railroad Cars ... 290
*President as Mediator in Wage Controversy ... 291
National Industrial Traffic League ... 293
British Railway Wages in 1913 ... 294

GENERAL NEWS SECTION ... 296

*Illustrated.

An Outside Point of View

The points made in the address published elsewhere in this issue, which was delivered by Paul H. King, operating receiver of the Pere Marquette, before the Association of American Railway Accounting Officers, are of especial interest because, as Mr. King says, he is a combination of the layman and the railroad man. Mr. King was in general law practice previous to his appointment as receiver of the Pere Marquette. He is able to observe from an outside point and to state freshly things that have impressed nearly every thinking railroad officer and yet things which most railroad officers have accepted as inevitable. The greatness of the capital outlay and the need of continually attending to it is something that has ceased almost to be a matter of concern to railroad men because so familiar, and yet it is a vital question as to where the necessary investment funds are coming from. We are made to feel somehow in Mr. King's address that this flow of investment funds will not go on inevitably unless a change takes place in the attitude of those states which look upon regulation only as synonymous with repression. Mr. King realizes, as men who have been close to railroad work their entire lives cannot realize, how little the problems of the railroads, despite the efforts that have been made in the past few years to put them before the public, are really understood by the average voter.

The President, the Brotherhoods and the Railways

At the time this editorial is written conferences are in progress at Washington between President Wilson and the representatives of the railways and the labor brotherhoods in an effort to effect a settlement of the railway wage dispute without a strike. The exact propositions the President has presented to the two sides have not been made public, but there are persistent reports from Washington, that he is urging the railways to grant the demand of the brotherhoods for an eight hour basic day and the brotherhoods to agree to arbitrate their demand for time and a half for overtime. The *Railway Age Gazette* refuses to believe that the President of the United States has suggested any such basis of settlement, for such a settlement would mean simply that the railways would give the brotherhoods the entire dog except the tail on condition that the brotherhoods would arbitrate whether the railways should also give them the tail. It is to be hoped that if the President has made any such proposal the managers of the railways will have the courage to refuse it. The railways have been fighting for a sound principle, the principle of the settlement of labor disputes by the fair and peaceable means of arbitration. The brotherhoods have been fighting for a false principle and one the triumph of which threatens the peace and prosperity of America, the principle that such disputes should be settled by force, regardless of the effects on the public welfare. When such a clear cut issue is presented can there be any question as to the attitude which the President of the United States should assume? The matters in the controversy have become comparatively a minor matter which can be settled by arbitration. The main issue is whether such controversies as the present one are to be settled by arbitration or by force. If the President causes or even asks the railways to grant the so-called eight-hour demand without arbitration he will do what he will find it very difficult to explain to a large majority of the American people.

Vanished into Thin Air

The New York World, in an editorial commenting on the suit which minority stockholders of the New York, New Haven & Hartford have brought to recover $102,000,000 from former New Haven directors, ends its remarks with the following: "They don't believe their money vanished into thin air. Why should they?" If the New Haven situation was caused by elements other than bad judgment of the management, unfortunate and unavoidable conditions, and other factors which do not reflect on the integrity of the directors, the suit which the minority stockholders are prosecuting should disclose these facts. But it is safe to say even now before the suit has been brought to trial that by far the greater part of the money, if not all of the money, which was lost in the New Haven has not vanished into thin air; neither has it gone into the pockets of insiders, but it has been spent on assets which are not capable of earning the interest on their cost. To vanish into thin air and to go into the cost of an asset which is neither salable nor has adequate earning power is a difference not only in language but of substance, although the results to the stockholders may be the same. Business men are continually taking chances in the conduct of their affairs; but most businesses have two safeguards which the railroad business entirely lacks: Either the man in another

business can try out an investment along a certain line step by step and be reasonably sure of what the results will be before the sum total of his investment along this particular line is made, or, if he must in the nature of the business make a very large initial expenditure it is for materials which are usable for other purposes, so that if his judgment is mistaken his assets will still have a sale value. The fact that an investment in railroad property is an investment in a permanent plant, capable of use for no other purpose but that of transportation, has been emphasized over and over again, but whenever a railway company in this country gets into financial difficulties the cry is always raised, "It is impossible for this amount of money to have been spent honestly and not bring any returns." Nothing of the kind. A great deal more money can be lost in the railroad industry by poor business judgment than the shrewdest and biggest thief would have any chance of stealing, and this fact is one well worth keeping in mind when the question of government ownership of railroads is discussed.

CAN A RAILROAD PROFIT BY PSYCHOLOGY?

THOSE who advocate the application of psychotechnics to that important class of problems in transportation, manufacturing and commerce which involve the human element define it as a means for "selecting the very best conditions and placing therein the very best men, to the end not only of increasing returns to the employer, but also of insuring health and happiness to the employee." Assuredly both of these objects are worthy, but can they be accomplished? The answer to this question will have to be supplied largely by the practical men who are asking it. There is no doubt about the advances that have been made in formulating the principles of this comparatively new science dealing with the human equation. The question is whether practical men are ready to give the necessary co-operation to determine what the value of an application of these principles will be.

Psychologists have rendered important service in the past in the matter of determining the best color for signal lights and other problems involved in the interpretation of roadside signals by an engineer. An article published elsewhere in this issue describes an extensive series of tests along this line, bringing out some interesting points and advocating the use of such tests for the selection and rating of enginemen. In view of the importance of this matter and the arguments in favor of such a selection it would seem worth while to give the plan a trial in service to develop its good and bad features and to suggest modifications that might lead to better results.

The psychologists can suggest a great number of lines along which similar work could be done to the advantage of the roads, such as the conducting of efficiency tests, the selection of train despatchers, taking testimony after an accident, and adjusting or preventing trouble with groups of employees. Possibly these things and others may be put in the hands of practical psychologists in the future, but this will depend largely on the results of the work now under way and proposed. Only by trying out the practical value of this theory and continuing the study in its relation to railroad operation can a final decision as to its value be reached.

The organization before which the paper referred to above was presented—The Economic Psychology Association—has been formed to bring the leading psychologists of the country in touch with the practical problems pressing for solution and business men in touch with psychological data that will assist them. This association is creating a committee on railroad problems, and it is to be hoped that sufficient support can be secured to enable this committee to give the plan a fair trial. With such support there is promise that a real service can be performed for the transportation industry. The Pennsylvania is already an active member of this association, and other roads will do well to consider joining it.

STATE DISCRIMINATION AGAINST INTERSTATE COMMERCE

THE decision issued last week by the Interstate Commerce Commission in the Business Men's League case, together with the recent decision in the Missouri river-Nebraska case, furnish additional conspicuous examples of a serious defect in our system of railroad regulation. Both illustrate the improvement which could be made by centralizing the authority now divided between the federal commission and the various state commissions. The Newlands joint congressional committee, which has just been appointed to make an investigation of the entire subject of railroad regulation, will undoubtedly find in both cases some interesting material for its study.

The condition with which the commission had to deal in both cases, as in the previous Shreveport case, was the discrimination against interstate commerce resulting from the reduction of intrastate rates by state action. In the Nebraska case the discrimination was caused by a 20 per cent reduction of state freight rates ordered by the Nebraska State Railway Commission. In the Business Men's League case a reduction in the Illinois passenger fares to 2 cents a mile made by the state legislature was involved. On December 1, 1914, the Interstate Commerce Committee allowed the eastern roads to advance their interstate passenger fares to a basis of 2½ cents a mile, which resulted in an increase in the fare from Chicago, Ill., to St. Louis, Mo., although the fares within the state of Illinois could not be advanced because of the state 2-cent fare law. The commission also in the five per cent case, allowed an increase in the interstate freight rates which affected St. Louis, while the Illinois Public Utilities Commission suspended a corresponding increase in the Illinois intrastate rates. The Business Men's League of St. Louis then filed a complaint with the Interstate Commerce Commission asking the removal of the discrimination against St. Louis and in favor of Illinois points, notably East St. Louis.

The commission has just issued its opinion as to the passenger fare situation, reserving the issues relating to freight rates for a subsequent report. It finds that passenger fares between St. Louis and Illinois points are unreasonable, in so far as they exceed 2.4 cents a mile, the rate fixed by the commission in the western passenger fare case, plus a reasonable bridge toll. It also finds that the present fares subject St. Louis to undue and unreasonable prejudice and disadvantage, which it orders removed, but it also indicates just how the discrimination shall be removed by saying that the intrastate fares "impose an unlawful burden on interstate commerce to the extent that the basis per mile of said fares is less than the basis per mile for fares for interstate travel."

The Nebraska State Railway Commission on September 6, 1914, issued an order prescribing a new schedule of class rates applicable to Nebraska intrastate traffic, approximately 20 per cent lower than the rates formerly in effect. As a result substantial changes were brought about in a long-standing relation of rates from and to the principal distributing centers on the Missouri river and in interior Nebraska, which compete for the trade of the state of Nebraska. The commercial clubs of Sioux City and Council Bluffs, Iowa, St. Joseph and Kansas City, Mo., and Atchison, Kan., filed complaints with the Interstate Commerce Commission, asking the removal of the discrimination against them, and in favor of Omaha, Lincoln and other cities in Nebraska. They also complained because of the discrimination in favor of Nebraska, resulting from certain ratings in Nebraska Classification No. 1, which are lower than those of the Western Classification governing interstate traffic.

The railroad defendants answered that the Nebraska intrastate rates were not made by them voluntarily, but were

published under protest and by order of the Nebraska commission, and that they considered them so unreasonable that they had appealed to the supreme court of the state from the commission's order.

The Interstate Commerce Commission, in its decision reported in the *Railway Age Gazette* of July 21, page 126, held that the commission-made state rates were "too low for application as reasonable maximum interstate rates between the Missouri river cities and points in Nebraska, and, therefore, too low to form the measure by which the unjust discrimination found to exist should be removed." It therefore prescribed a scale of class rates to apply between Sioux City, Council Bluffs, St. Joseph, Kansas City and Atchison, and points in Nebraska, based mainly on the present interstate rates, and ordered the roads "to cease and desist from giving any undue preference or advantage" in rates or classification ratings to the Nebraska points on traffic to or from Nebraska, and from subjecting the interstate shippers in the complaining cities "to undue and unreasonable prejudice or disadvantage with respect to said rates."

The carriers will, therefore, proceed to advance the state rates in both cases to the level of the new scale prescribed by the Interstate Commerce Commission; the commission will, in effect, have prescribed intrastate rates, and after a great deal of tinkering the rates in course of time will probably be satisfactorily adjusted. A more cumbersome method of regulating rates could hardly be devised. How much better it would have been for all concerned if one authority had had the power to deal with the entire situation from the first without the long and tedious process of repeated investigations and controversies which has probably not yet been completed.

First, the Nebraska commission conducted an elaborate and protracted inquiry which involved a large expense not only to the state, but to the shippers and the railroads. Then a schedule of rates which, it was estimated, effected a reduction in the revenues of the carriers of from $1,200,000 to $1,400,000 a year, and which the Interstate Commerce Commission now says is too low, remained in effect for two years while the interstate shippers who were competing for trade in Nebraska lost business on account of the discrimination against them. A somewhat similar situation existed as to the Illinois case. Finally, the Interstate Commerce Commission has spent nearly a year making its investigation and findings, and a great deal more work will be required before the roads will be able to readjust their rates from Nebraska to the new scale from points outside the state fixed by the commission's decision. The adjustment of the Texas rates involved in the Shreveport case has not yet been completed, after three or four years of litigation.

The federal commission credits the Nebraska commission with good intentions and with having made an "earnest endeavor to deal with the complex problem of rate-making with justice to all parties before it." The Nebraska commission apparently did not, however, consider the interests of the parties which were not before it, the shippers just over the state line, who were just as specifically affected by its decision as were the Nebraska shippers, and who are entitled to use the facilities of the railroads on as favorable terms as the Nebraska shippers.

It is not necessarily a reflection on the Nebraska commission or any other state commission to say that the possibility of the existence of such a situation as this demands an extension of federal authority over rate-making. There may be cases where the state commissions are right and the federal commission is wrong; but where they differ both of them cannot be right and one must prevail unless our rate structure is to be thrown into a worse chaos than that which prevailed before regulation. Interstate railroads and commerce which know no state line cannot be adequately regulated under a system which is limited by state lines, especially in combination with another system in which such restrictions play no part.

THE MENACE OF A BAD CAR SHORTAGE

THE statistics regarding the freight car situation on August 1, which were issued by the American Railway Association this week, are the most ominous for that date that ever were compiled. They indicate clearly that unless there is some unexpected and radical change in commercial, industrial and transportation conditions the railways and the shipping public will have to deal this fall and winter with one of the worst shortages of freight cars in the history of the United States. The car shortage in the fall and winter of 1906 is believed to have been the largest ever experienced, but no statistics on the subject were compiled before 1907. The gross shortage reported on August 1, 1916, is the largest, the gross surplus is the smallest and the net surplus is the smallest ever reported on that date since statistics regarding these matters have been kept. The net surplus was only 10,616 cars. The smallest net surplus previously reported on August 1 was that of 1907, which was 27,836 cars, and in the fall of that year there was a severe car shortage, the net shortage rising on October 30, 1907, to 86,800 cars.

Past experience seems to indicate that whenever the net surplus in the early part of August is less than 100,000 cars there is pretty sure to be a net shortage beginning in October or the early part of November. There were only three years from 1907 to 1915, inclusive, when the net surplus on August 1 was less than this. These were 1907, 1912 and 1913, and in every one of them there was a car shortage in the late fall and early winter. The figures regarding car shortages and surpluses on August 1 for the last 10 years are as follows:

FREIGHT SHORTAGES AND SURPLUSES ON AUGUST 1 FOR TEN YEARS

August 1	Shortage	Surplus	Net Surplus
1916	37,292	47,908	10,616
1915	888	265,131	264,243
1914	2,333	198,998	196,665
1913	11,261	69,716	58,455
1912	9,394	65,904	56,510
1911	2,045	130,136	128,091
1910	2,783	105,564	102,781
1909	169	207,173	207,004
1908	635	281,621	280,986
1907	18,814	46,650	27,836

In view of the serious condition which these statistics indicate will exist within the next few months unless heroic treatment is applied, it behooves the managers of the railways and the large shippers of the country to take steps at once toward the adoption of some plan of co-operation which will result in the car supply of the country being utilized in the most efficient manner possible. There are enough cars to transport the country's business if only they shall be handled with care and efficiency. The statistics plainly indicate that unless they are thus handled there is going to be serious trouble. Past experience has shown that a bad car situation may be made much less bad than it otherwise would be by the exercise of foresight and energy by the railways and the shippers, and by prompt and friendly co-operation.

NEW BOOKS

Structural Timber Hand Book on Pacific Coast Woods. By O. P. M. Goss, consulting timber engineer. 290 pages, 5¼ in. by 8 in. Bound in leather. Published by the West Coast Lumberman's Association, 1016 White building, Seattle, Wash. Price $1.

Until within the last few years there has been little accurate information concerning the four principal woods produced on the Western coast—Douglas fir, Western red cedar, Western hemlock and Sitka spruce. With the increasing use of these materials in construction work, not only in the Western states but throughout the entire United States, there has arisen a demand for accurate information concerning these timbers. In this book is collected a large amount of original data and that compiled from other sources which should be of value to the engineer using these classes of timber. The book contains a large amount of tabular data regarding the size, weights and strength of these timbers and also much information concerning the special qualities of these timbers and the work for which they are suited.

Letters to the Editor

CURTAINS FOR CROSSINGS

QUOGUE, N. Y.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

A correspondent of the New York Evening Post, who evidently takes a rational view of the automobile peril, proposes that, as the rather frail gate-bars at railroad crossings do not appear to do much toward the prevention of automobile accidents, there should be substituted a curtain of some light opaque material, stiffened and weighted a little with sharp spikes projecting toward the road; this to be raised or lowered between gate posts. An automobile driver, not being able to see ahead and knowing that a collision with the spiked curtain would damage him a good deal, would be pretty certain to stop until the curtain was raised.

This is an admirable idea. The only improvement on it that I could suggest—and this suggestion naturally rises to one's mind who lives on Long Island and who reads the war news from France—would be a curtain of fire, like those which the contending armies use to protect themselves from each other in the valley of the Somme.

L. I. SPEONK.

ONLY THE RICH CAN BE ECONOMICAL

BALTIMORE, Md.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The paper by M. K. Barnum, superintendent of motive power of the Baltimore & Ohio, on the life of steel cars, in your issue of March 3, is of great interest. One had been looking for information on this point, as steel cars in large quantities have now been in service long enough to give a line on their average life.

It is gathered from the information supplied that the life of steel cars depends to some extent on the nature of the service in which they are employed, but that as a general proposition 16 years is an outside limit, thus calling for a 5 per cent rate of depreciation on a price of $1,000 per car. If the price rises say to $1,200, the rate of depreciation must also rise, and for $1,200 in 16 years it must be no less than 6.33 per cent, since the life of a car unfortunately does not increase with its price.

The broaching of this subject offers the opportunity of considering the whole question of car purchases and the provision of funds for replacement. It is, of course, well known that the car trust method of purchasing cars is very widely practiced, but it is apparently not so generally recognized that this is a very extravagant way to maintain or develop a company's equipment. It means the payment of large amounts of interest, so that the contract price by no means represents the actual cost of the equipment. Moreover, while charges for depreciation cannot now be avoided under the law, these too often amount to mere bookkeeping entries, funds ostensibly reserved for replacement being diverted for other expenditures which may or may not increase the revnues. As a consequence when replacement is required new car trusts have to be formed and it may be necessary to form them at times when money is scarce and both money and prices are high. Thus the process of interest paying goes on with no end in sight. In other words, companies remain everlastingly behind their equipment instead of getting and keeping in front of it. Let us enforce the position by a few figures.

Assume the purchase of 1,000 steel cars under the car trust method. Let their contract price be $1,200 each and the terms of payment $200,000 down and the balance in ten years by car trust notes of $50,000 each, payable semi-annually with interest at 4 per cent. The total payment under this arrangement will be:

Cash	$200,000
Notes—Principal	1,000,000
Interest	210,000
	$1,410,000

making the cost of the average car $1,410 against the contract price of $1,200. The depreciation to be provided would be the contract price of the cars less scrap value, which Mr. Barnum gives as $200 per car, or $200,000 for the 1,000, so that the annual depreciation requirement for the sixteen years' life of the cars would be $62,500. Therefore the annual burden on the revenue during the first ten years, or five-eighths of the life of the cars, would be:

Two notes at $60,500	$121,000
Depreciation to realize $1,000,000 in 16 years	62,500
Annual charge for ten years	$183,500

Such is the condition when a company remains behind its equipment.

Now let us contrast with this the condition when a company gets, so to speak, in front of its equipment, and by this we mean when a company not only has the money to pay out-of-hand for what it proposes to buy, but is also in a position to set up a genuine bona-fide cash reserve accumulating at compound interest against the falling in of the cars. The operation in respect of the reserve is of the nature of a sinking fund operation, and, in order to provide against disappointments in investments and unused funds, we will use the low rate of 3 per cent for the accumulation.

On this basis, the amount required being $1,000,000 and the time sixteen years, the annual cash appropriation will be $49,600, or for the sixteen years a total of $793,600, and this is all that need be charged into the expenses for depreciation to comply with the full spirit of the law.

Summarizing the whole situation under the significant headings "Behind" and "Before," we have:

Behind		Before	
Cash	$200,000	Cash	$1,200,000
Notes—Principal	1,000,000	Reserve or Depreciation Fund	793,600
Interest	210,000		
Depreciation	1,000,000		
	$2,410,000		$1,993,600

showing a difference in favor of "Before" of $416,400 per 1,000 cars.

Now it is all very well to point out ideal conditions, but not of much practical utility unless some indication is given of how these conditions are to be attained. With the object of supplying this missing link let us consider what burden would be placed on the earnings of 1,000 steel cars in order to provide $793,600 in sixteen years, or $49,600 annually.

Assuming an average carload as weighing 45 tons and a rate per ton per mile of 3 mills, we have a car mile value of 18 cents.

Assuming an average daily movement of 30 miles, the 1,000 cars would accumulate 10,950,000 miles, of which assume 40 per cent empty, leaving 6,570,000 loaded. 6,570,000 loaded miles at 18 cents realizes a gross revenue of $1,182,600, and this sum divided into $49,600 gives a percentage of 4.194.

In the judgment of the writer there is no more important element in the multiform question of the relations between the legislatures, the commissions, the public and the railroads than the securing of economical methods of maintaining the appliances with which the railroads perform their transportation service. The foregoing figures show that the car trust

method of maintaining equipment is very essentially extravagant, yet on the present basis of rates there is no prospect of permanently getting away from it even after allowing for the added revenues from such increased rates as have been recently allowed.

The freight carried in all steel equipment is largely of those classes on which increased rates have not been allowed. Were a 5 per cent increase allowed with the understanding that the returns from such increase are to be devoted to the establishment of genuine renewal funds for the equipment, at one sweep a gigantic move would be made towards stabilizing the investment value of railroad securities and an enormity of anxiety cleared from the minds of devoted railroad men.

There should be but little more difficulty about managing a renewal fund than a car trust. If the funds of a bank can be managed to realize anywhere from 6 to 50 per cent for its stockholders, the funds of a renewal fund ought, it would seem, to be easily made to realize a modest 3 per cent as above set out.

It is not because I consider in the slightest degree this proposition of getting before the equipment a misshapen mythical or mysterious plan, but because I am looking to the welfare of unborn generations, that I sign myself,

A RAILROAD FUTURIST.

IMPROVING THE CLERK'S OPPORTUNITIES

EDMONTON, CANADA.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring to the letter signed "Another Clerk," in your issue of July 14, page 54, I do not know in what department the writer of the letter referred to is employed, but I will express my views from the standpoint of one engaged in the operating department, in a district superintendent's office.

Ambition beyond question is the essential factor to success, but in my opinion opportunity plays an equally important part, and constitutes the missing link. By opportunity I mean being so favorably located that those in a position to appreciate one's ambitions can observe the inclinations and exalt the ambitious clerk to the position his devotion to his duties entitles him.

Let me cite an actual case which now occurs to me, of what opportunity did for a young friend of mine. About four years ago I was surprised to learn that he was not a stenographer. He was only about eighteen years of age, but had been working in the office in which I was working for about three years, and apparently had no intention of taking up stenography. I pointed out the importance of so doing and after a while succeeded in persuading him to take it up seriously, personally instructing him in the art, being myself a qualified teacher. After a brief space of time a vacancy occurred in the office, that of secretary to the superintendent, and as he was my pupil, and feeling if given a fair trial he could handle the position satisfactorily, I recommended him to the chief clerk, who appointed him to the position. Since that time we have both been transferred to different points, he writing for general superintendents; today he occupies the enviable position of secretary to the senior vice-president. It is from such positions the higher officials our friend refers to have risen. Of course they have had to work hard, but what an incentive, when one is working for the man at the wheel. There are hundreds of us who are working just as hard, if not harder, but who have not the good fortune to be under the personal observation of such a personage. We get a periodical glimpse of the higher officials, but that is all.

I hope to outline a system which, if adopted by the railways, will give everyone an equal chance to display his best abilities. There is a great deal of good material in the clerical forces which, owing to lack of opportunity, is never revealed, whereas under a proper system all clerks would at least be given a trial, and, if incapable, would have to give way to their more capable fellow workers—the survival of the fittest.

It is a great incentive to know that the reward for faithful duty, coupled with ability, will be the next highest position in the office in which one is working, or its equivalent in another office, when such a vacancy occurs. Of course, as far as my experience goes, this system has been followed in the individual offices, but there is a limit, and that is when the position of assistant chief clerk or assistant accountant has been reached. It is at that point that the system, which I shall now outline, would commernce its duties.

1. A set scale of salaries for different positions in the same class of office.

2. Periodical recommendations for promotion should be made from the chief clerks, assistant chief clerks, accountants and assistant accountants, to fill positions such as yardmaster, assistant yardmaster, chief clerk, etc.

3. All vacancies on the entire railway system, superior to those of the assistant chief clerk, or assistant accountant, to be bulletined, and those desiring to make application for same to do so and appointments to be made from the applications received, the position being awarded according to length of service coupled with ability.

The adoption of such a system would not only eliminate dissatisfaction, but would secure a standard of efficiency such as has not yet been enjoyed, and would be beneficial from an educational point of view, making the successful clerks familiar with new territories, until eventually they would be conversant with the entire system, which knowledge could not be other than advantageous to the company which employs them.

The second part of the system I have outlined is in use by the company for which I am working, but I would like to see it generally adopted in full and to apply to the whole railway system, instead of the particular division on which one is working.

It is a good policy, and one which I follow, to get out on the road in one's spare time, and get acquainted with actual conditions. One is thus able to understand technical terms and handle to a greater degree of satisfaction the correspondence requiring practical knowledge. Insignificant though the clerk's position may appear, he can, by following the aforementioned procedure, become a valuable asset to the district officers, and handle correspondence as satisfactorily as if it received personal attention; in fact, in an officer's absence it is occasionally necessary to give a decision regarding different matters which could not possibly be given without the practical knowledge so gained.

There may be some readers who will criticize my views, concluding that the adoption of such a system would be but the thin edge of the wedge towards a railway clerks' union. Let me here emphatically state that such is not my intention. I am firmly convinced that a railway clerks' union is a mistaken and impracticable idea. A trades union always creates a certain amount of antagonism between employer and employed, and as staffs in superintendents', general superintendents' and general managers' offices are handling matters of a confidential nature, oftentimes affecting other organizations, it would be impossible to be a member of a union without sooner or later betraying the confidence reposed in one. Let me appeal to the advocates of a railway clerks' union to view the matter from that point of view, and they will see the fallacy of their opinions. However, when we consider that men engaged in maintenance of way work, a large percentage of which are foreigners, and whose education has cost practically nothing, are recognized by the various railway companies, it is surely obvious to all reasonable thinkers that the clerical forces are entitled to some consideration, and I am convinced that if railway companies will adopt the system I have outlined, their clerical staffs

will be satisfied, and the death blow to the agitation, which arises periodically, for a railway clerks' union will have been dealt. BOBS.

CONCRETE AND ASPHALT ROADS TO PROMOTE FREIGHT TRAFFIC

PHILADELPHIA, PA.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Allow me to call your attention to the question of good roads (highways). Congress is going to give the states and municipalities many millions of dollars for this purpose and the railways should stir themselves to get their share of the benefits. The money to be expended should not all go for pleasure roads or lines parallel to railroads; feeders, to facilitate the movement of farm produce to country stations, are needed everywhere. In a good-roads pamphlet published some years ago by the Pennsylvania Railroad, it was stated that millions of tons of the freight hauled over the company's lines were moved in wagons either before or after the rail journey, and that there were more than 400,000 miles of public roads in the states through which the Pennsylvania system operates. Years ago millions of dollars were invested in the building of railroads through lands only potentially valuable before the roads were constructed, and time has demonstrated the wisdom of this far-sighted policy. If it was profitable to do this, would it not be even more profitable to seek greatly multiplied produce shipments from a thickly populated district by removing the one serious obstacle—the bad road? Furthermore, the produce that does reach the railroads over bad roads is hauled at excessive cost. Government figures fix the loss or excess cost at $250,000,000 a year.

The highest prices for produce prevail when the roads are impassable and prices decline during the brief time the roads are in good condition. Bad roads curtail shipments during the greater period of the year and cause congestion of traffic during favorable periods. The farmer who lives 9½ miles from the railroad pays more to haul a bushel of wheat that distance than it costs to ship it from New York to Liverpool. It costs six cents more today to haul a ton of produce one mile over the old Cumberland Pike than it cost the farmer of 70 years ago.

Every mile of highway passing through productive land is or should be a branch of the nearest railroad—a branch road that should be passable at all seasons. Many roads that are not main roads now would become such were they improved, and in so far as the railroad is concerned these back-country roads would be immensely more profitable than roads paralleling railroads.

Macadam roads are regarded as an obsolete type where motor traffic prevails, and the cost of maintenance of such roads is in excess of that of any other type. The nearest approach to the ideal farmers' road appears to be the type adopted by the taxpayers of Monroe county, Michigan. This road has a 5-in. concrete foundation with 6-in. concrete curbs cast with the base. Between the curbs is placed 2 in. of natural asphalt macadam so as to insure a resilient wearing surface suitable for both horse and motor traffic. The first contract let called for the construction of some 14 miles at a cost less than $12,000 a mile. This is a remarkably low figure and below the price some states are paying for water-bound macadam roads. The concrete foundations may be increased or diminished in thickness to meet varying traffic requirements.

Old stone or macadam roads thoroughly compacted by years of travel, make excellent foundations and can be cheaply resurfaced with asphalt-bound stone. While costs differ in different localities, from $6,000 to $7,000 per mile for 16-ft. roads is a fair average. Such old roads must be resurfaced in any event if kept in good condition, so the real investment is in a permanent binding material. Durable roads are not beyond the resources of farming communities, and if railroads were to give the matter of highway improvement special attention, as they do other ways of increasing shipments, they would find it profitable. D. T. P.

TO KEEP TRAIN MEN VIGILANT

JACKSONVILLE, Fla.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The Safety First Committee of our road, of which I am a member, has recently had before it a record of 1,600 train accidents of which over 50 per cent were due to some fault or weakness in the human element. This fact, which is similar to other well-known statements familiar to the reader, is a reminder that the problem of the personnel is still the biggest thing with which we have to deal. My service on this committee and in the locomotive cab for 25 years convinces me that something must be done to keep men from getting into ruts. The practice of having members of the same engine crews work together year after year ought to be stopped. I do not mean to say that all men shirk their work, but many of them do. All the members of a crew are well acquainted; and where they have worked together in the same cab or caboose for two or three years it is not strange if there is a gradual letting down of the standard of work. The conductor and the engineman more and more delegate duties to the men below them, and after a time the work is not done as it was intended to be done. This spells inefficiency. As a remedy, why not at regular periods shift the members of the crews around?

My regular fireman, a man that I have trained to fire as I want the work done, burns two tons of coal less per trip than any of the extra men that I have had now and then. With the inefficient men it is difficult, sometimes, to keep a sufficient supply of coal from one coaling station to another. With the proper shifting about of the men, the incompetent firemen would be exposed and a suitable remedy would be applied.

Take again the case of a conductor and an engineman who have worked together for years. Probably they have become fast friends. Naturally, these friends will trust each other; but one of the principles of train-running, in the interest of safety, is that these two men shall *not* trust each other. Each should be a check upon the other. Any railroad man of experience will recall instances of where an engineman has overlooked an order to meet a train and where the conductor should have detected the fault, but was trusting the engineman. Having a man of known and reliable habits on the front end of the train he relaxes his vigilance. But the best of men fail at times; and when the engineman makes a mistake it cannot be rubbed out. On one occasion when I returned to my regular train after a short layoff, the conductor told me of his gratification at my return, and said that he had to watch the extra men all the time. This may have been an unpleasant thing for him to do; but it really is a normal thing. I, as a runner, may forget some safeguard; and I desire to have my conductor, in the interest of my job, and of preserving my life, watch me and help me to do my duty in the best possible manner.

Efficiency and safety both demand that each person in the railroad service shall do the utmost that he can to perform the duties for which he is employed; and in such a critical business the co-operation which I have advocated is, consequently, necessary. WM. BAILEY THOMAS.

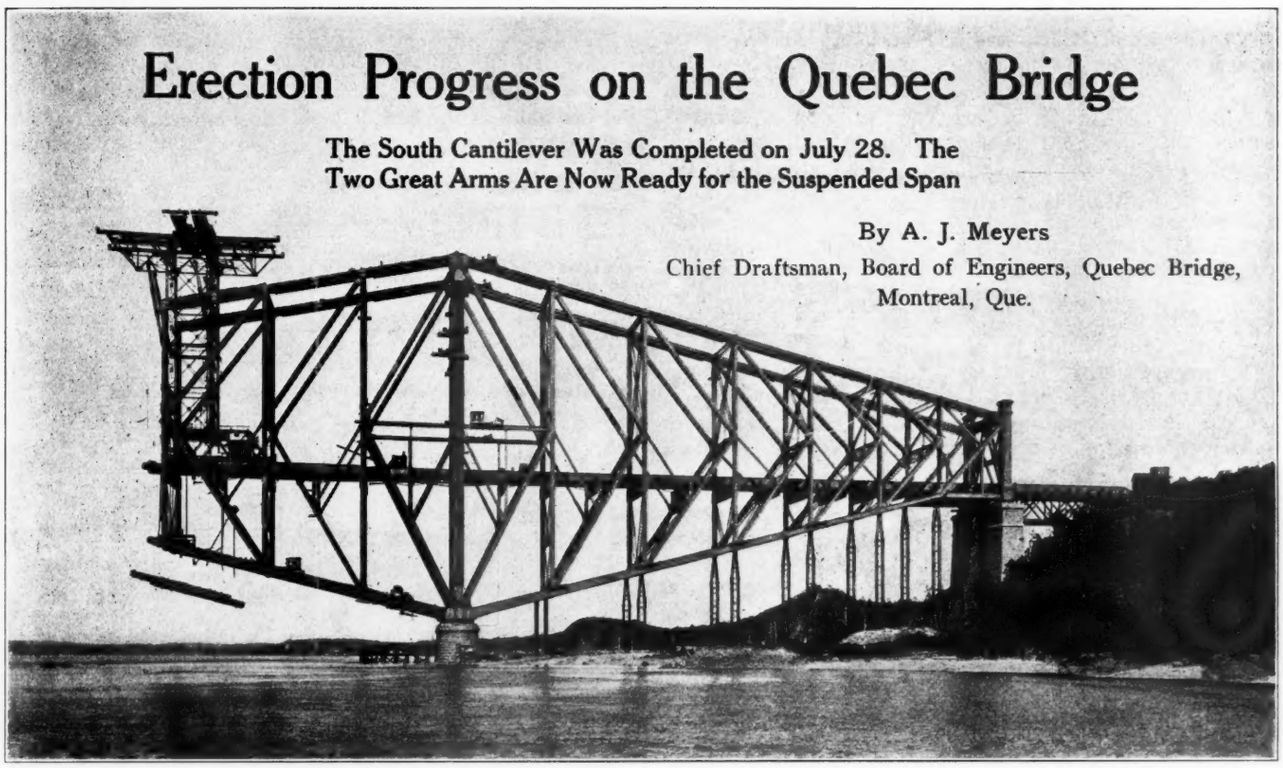
AUSTRALIAN RAILWAY STRIKE ENDED.—At the request of a majority of the general workers employed on the eastern section of the Transcontinental Railway line, the 40 clerks who were lately on strike at Port Augusta have resumed work, and the trouble has come to an end.

Erection Progress on the Quebec Bridge

The South Cantilever Was Completed on July 28. The Two Great Arms Are Now Ready for the Suspended Span

By A. J. Meyers

Chief Draftsman, Board of Engineers, Quebec Bridge, Montreal, Que.



South Cantilever on June 12, 1916

THE material for the new Quebec bridge erected on the south bank of the St. Lawrence river during the season of 1915, amounted to approximately 17,000 tons of bridge material and 3,000 tons of falsework. This steel was placed by one traveler in about five months' working time, and consisted of the inside falsework carrying the anchor arm floor and traveler tracks, the outside staging carrying the anchor arm truss material, sway and lateral bracing, and the south anchor arm including the main post and the links at the top of the main post, which connect the top chords of the cantilever and anchor arms.

At the close of the working period of 1915, the traveler was standing over the south main pier, prepared to begin the erection of the south cantilever arm as soon as the working season of 1916 opened. This involved 13,000 tons of steel and was started about April 1, 1916, after the traveler machinery and tackle had been thoroughly overhauled and put in working condition.

As illustrated in a drawing and a photograph, the bottom chords of the cantilever arm were erected by means of an erection bridge which temporarily supported the different parts of the chords until they were properly alined, the splices were riveted up, and the pins connecting the chords to the web members of the truss were driven. The bottom chords throughout the cantilever arm are made up of four vertical plate girder webs, laced together longitudinally in three horizontal planes. They are built entirely of nickel steel. The largest section in the first main panel adjacent to the main pier has a cross-sectional area of 1,630 sq. in. The outside dimensions are 84 in. deep by 124 in. wide. Each main panel of the bottom chord was divided into two half-panel sections, the members being fully spliced at this half panel point both as to material and rivets, as well as being accurately faced to as nearly a perfect bearing as modern shop equipment and machinery could make possible. Each half section was again divided vertically along its longitudinal center line. The members were shipped and handled in these sections, the heaviest section weighing 160,000 lb.

Each section was handled by means of specially designed and tested hitches, bolted to the top flanges, two sets of hitches to each section. The sections were lifted from the cars in pairs at the same time, one section for the east truss and the corresponding section for the west truss, all four of the 55-ton hoists of the two traveler cranes being used, one hoist of each crane to a section. The traveler therefore lifted and placed at one time approximately 320,000 lb. of steel. The sections after leaving the cars were fleeted apart until they hung vertically over their final positions in the bridge, when they were lowered into place on the erection bridge.

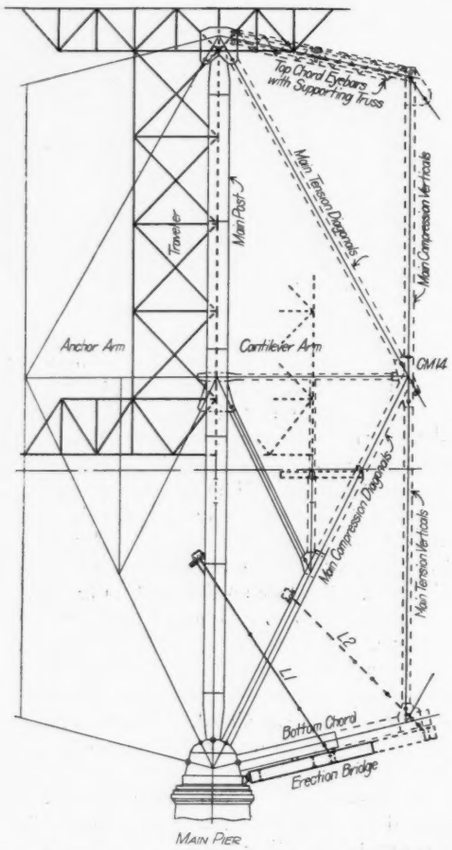
The erection bridge was a complete erection unit and was handled as such. It was made up of four longitudinal plate girder webs of a length equal to the longest main panel of the cantilever arm. These webs were placed together in pairs under each cantilever arm chord. The pairs of webs were braced together by two transverse plate girder webs with a lateral system of their own. These transverse plate girders were used to support the bottom lateral members until they were connected up to the chords. The two girders of each pair were connected together by a bottom lateral system and cross girders which served as seats for the jacks which were used for alining the chords to make the splices and for jacking up the completely riveted chord to make the pin connections to the web members above.

The main compression diagonals are built-up members with an arrangement of cross section similar to that of the bottom chord members, but of much smaller area. They were spliced, shipped and handled in a manner similar to that for the bottom chord members. Those in the panels next to the main pier, where the weight of the member has very little influence on the stresses in the remainder of the bridge, are made of carbon steel. In all the other panels of the cantilever arm these diagonals are of nickel steel. They were supported and adjusted, while their splices and end connections were being made, by means of tackle leading from the sub and main panel points of the diagonals to the bridge members in the panels already completed.

The main tension diagonals are built up of four plate girder webs; the webs are connected and riveted together in

pairs by means of lattice bars and tie plates; the pairs are connected together by means of spacer tie plates. The largest of these tension diagonals, in the panel next to the main pier, is 150 ft. 6⅛ in. long center to center of end-connecting pins. For this member each pair of webs was shipped to the bridge site in three sections making up the total length of the completed member. Before erection, these sections were assembled together on the floor of the bridge between the bridge trusses and the traveler. The splices were there completely riveted; each pair of webs was then hoisted into position separately by the traveler in one piece. These main tension diagonals were all of nickel steel, except those in the panel next to the main pier.

The pin holes at the lower end of the main tension diagonals, and at the upper end of the main tension verticals were slotted ¼ in. on the side remote from the bearing surface to facilitate the driving of the last connecting pins. The main

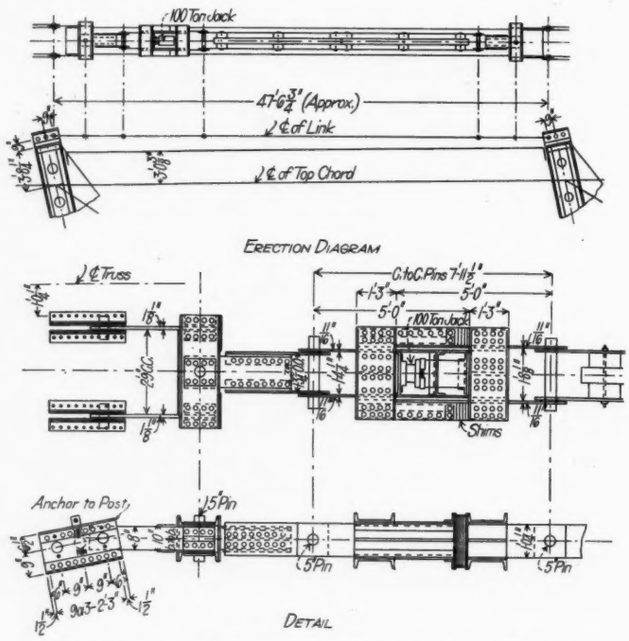


Erection Diagram of First Panel of Cantilever Arm

tension verticals were all built of nickel steel and are of a design similar to the main tension diagonals. They were spliced, shipped and handled in a similar manner. All the main compression verticals are similar in construction to the main compression diagonals, and were handled in the same way.

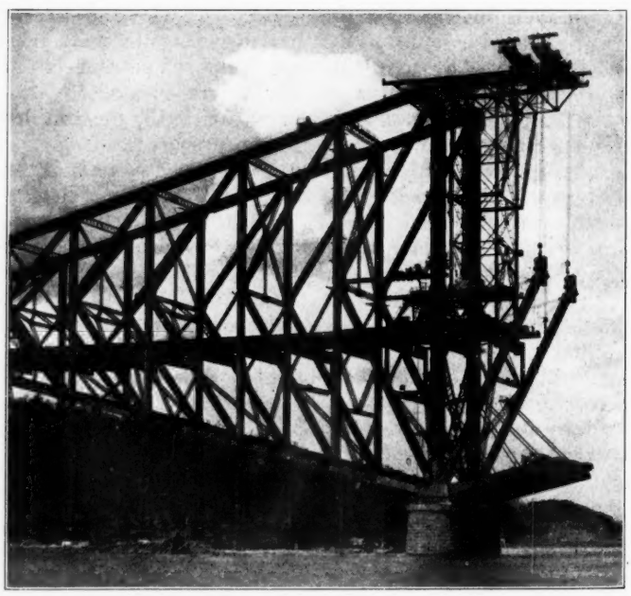
The main panel top chords in the cantilever and anchor arms are composed of two lines of eye-bars, spaced 3 ft. 6 in. center to center vertically, one above the other. Each panel of eye-bars in all panels over 50 ft. in length is made up of two lengths of eye-bars per panel, pin-connected to each other at the middle point of each panel where the weight of the pins and one-half the weight of the eye-bars is taken by a pair of supporting trusses. The eye-bars were assembled with the supporting trusses in the storage yard and the middle pins put into place. They were then taken out on the bridge and hoisted into position, one-half the bars in each panel being placed at one time.

As soon as the eye-bars and supporting trusses were erected, the adjusting links, illustrated in one of the drawings, were placed in position. The top chord eye-bars had the pin holes at the end of each panel slotted ¼ in. on the side remote from the bearing surface, and these adjusting



Adjustment Link for Erection of Top Chords

links were used to draw the top chord main panel points together so that the top chord pins could be easily driven into the elongated pin holes of the eye-bars. These top chord links also took care of any erection stress in the top chord



Traveler Erecting Material for the First Main Panel of Cantilever Arm

panel until the eye-bar pins at each end of the panel were driven.

The erection of the first main panel of the south cantilever arm was completed by April 28, 1916. The time actually worked was 22½ days of 10 hours, only 2½ days having been lost on account of high winds and rainy weather. The

amount of steel erected during this time was approximately 3,100 tons, and included the placing of the largest, longest and heaviest members of the cantilever arm. An average of 200 men for each working day was employed on the work, including from six to eight gangs of riveters.

The material in the second main panel weighed in the neighborhood of 2,650 tons, and was erected by May 26—in 18 working days. The 1,960 tons in the third main panel was placed by June 12—in 13 working days. As the traveler progressed towards the end of the cantilever arm, the members handled were lighter and the field splices fewer and smaller; the rate of progress was therefore greatly increased. By July 10, 1916, the traveler was standing at panel point 4, having completed the erection of six main panels. The fourth, fifth and sixth main panels were erected in 22 working days, the total weight of steel placed in this time amounting to approximately 3,600 tons.

The traveler was moved to its last position at the end of the seventh main panel on July 20. The last two main panels

Erection Bridge Placed in Position to Receive Bottom Chords

were erected in 18 working days, the amount of steel placed being about 1,280 tons.

The erection of the south cantilever arm was completed by July 28, 1916. The total weight of steel placed was about 13,000 tons; the actual number of days worked was 92, about 27 days being lost from inclement weather, Sundays and legal holidays. This cantilever arm was completed in over 25 per cent less working time than was taken for the north cantilever arm, and over a month ahead of schedule time. With the completion of the south cantilever the bridge is in readiness for the floating in and hoisting of the suspended span. This span, which is 640 ft. long, 88 ft. wide, and weighs in the floating in condition approximately 5,000 tons, was described in the *Railway Age Gazette* on May 26, page 1143. Its erection has proceeded simultaneously with that of the south cantilever arm and it is expected that it will be placed in its final position in the bridge during the early part of September, 1916.

The work is being carried out under the supervision of the Board of Engineers, Quebec Bridge, consisting of C. N. Monsarrat (chairman and chief engineer), Ralph Modjeski and H. P. Borden. The St. Lawrence Bridge Company is the contractor for the superstructure, George F. Porter being engineer of construction, W. B. Fortune superintendent and S. P. Mitchell consulting engineer of erection.

THE PROPOSED CLEARANCE LAW

The so-called "safe clearance" bill, H. R. 16681, has been reported to the House from the Committee on Interstate and Foreign Commerce and is now on the House calendar awaiting action. In reporting the bill the committee made several important changes from the original form in which the measure was introduced by Congressman Decker last June. As the bill now stands, it may be summarized as follows:

The clearance between engines and cars and all structures or obstructions hereafter erected is to be not less than 36 in., and the clearance between cars, on which men may have to be, and overhead obstructions hereafter erected, is to be not less than 6 ft. The bill specifically states that these limitations shall not apply to platforms rising not more than 4 ft. from the top of the rail, and that the clearance for mail catching or receiving devices may be reduced to 24 in. while the device is in position for operation.

One year after the passage of the act the clearance between trains and switch stands, mail cranes, water cranes, poles, stock pens, standpipes and hog drenchers now existing, shall be not less than 36 in., and the clearance between cars, etc., and overhead obstructions, except bridges, viaducts and tunnels built before the passage of the act, shall not be less than 6 ft. The provision relating to devices for catching mail, above mentioned, is made applicable to this section.

Twenty-four inches is the amount of clearance required between trains on parallel tracks, the requirement dating from one year after passage of the act.

The Interstate Commerce Commission is empowered, upon investigation and hearing, to allow a clearance less than that prescribed, provided that compliance with the law would "prevent or substantially impair the ability of the carrier to perform its duty to the public." The Interstate Commerce Commission is allowed to extend the period within which any railroad may comply with the provisions of the law.

No railroad is allowed to permit the space between those of its tracks which ordinarily are used by employees to be obstructed by obstacles which will interfere with the work of the employees or subject them to unnecessary hazard.

Penalties ranging between $100 and $500 are provided for each and every violation; and each time that any locomotive or car is used in violation constitutes a separate offense.

The proposed law is not to render inoperative State legislation governing the use of telltales for overhead obstructions (approaching bridges or tunnels).

Roundhouses and other structures, including construction and repair shops, are excepted. Electric street railways and electric interurban railways are also excepted.

The last section of this bill amends the original safety appliance act so as to except from the requirement relating to automatic brakes all trains used exclusively for hauling sugar in Porto Rico.

The report on the bill, No. 979, explains the principal provision, sets forth the reasons for the bill, and concludes with a mass of statistics supplied wholly by the railroad brotherhoods showing casualties arising from employees coming in contact with overhead and side obstructions, together with statistics showing the cost to the railroad brotherhoods on account of such casualties.

The committee dismisses the item of cost to the railroads of complying with this law as "comparatively slight" and declares that it will be distributed over a period of time so that "the burden will not be onerous. The bill as recommended," it is declared, "meets the principal objections made by the carriers to the bill which was first introduced, and their interests are fully guarded."

The House may take up the bill almost any day and pass it with little or no debate. But in the Senate the congested condition of the calendar may cause such delay that consideration at this session will be out of the question.

A. B. STICKNEY

A. B. Stickney, formerly president of the Chicago Great Western, died at his home in St. Paul on August 9, as was announced in our news columns last week. In 1892 A. B. Stickney, who since 1884 had been president first of the Minnesota & Northwestern and then of the company with which it was consolidated—the Chicago, St. Paul & Kansas City—reorganized the company under the name of the Chicago Great Western. The Chicago Great Western was made a company under this reorganization plan without a funded debt. Cash necessary to rehabilitate the property was estimated at $3,500,000 and it was then expected to obtain this cash from assessments on the common stockholders and income bondholders of the Chicago, St. Paul & Kansas City and from the sale of $2,000,000 4 per cent debenture stock. Only about $1,300,000, however, was realized in this way, and by the end of February, 1894, there was a floating debt of $1,023,000. Eventually this floating debt, which grew to amount to $10,653,000 by January, 1908, was too much for the company and a receiver was appointed on January 8, 1908. A large part of the Chicago Great Western's securities were held abroad. The theory on which the 1892 reorganization took place was that it ought to be possible for the stockholders to own their railroad and to run it so as to return a profit to themselves; moreover, if no part of the property were mortgaged the stockholders would have a first claim on surplus earnings and this would give the stock an actual value as an investment which stock junior to a more or less heavy mortgage would not have. This theory of railroad financing has been successful in England, but did not prove to be a success in the United States. There were two factors which worked against this: The earning power of the Chicago Great Western did not increase as time went on as rapidly as it had been estimated and investors abroad did not come forward as readily to buy American railroad securities unsecured by a mortgage as had been expected. The Stickney plan of a bankruptcy-proof railroad company failed and it was found that general creditors of a railroad company could put it into the hands of receivers just as effectively as could holders of bonds secured by a mortgage.

A. B. Stickney

In the actual management of the operations of the Chicago Great Western certain unusual methods were adopted. On the theory that statistics if analyzed sufficiently would not only record events that had taken place, but would give the basis for the formulation of a policy to be pursued in the future, elaborate fixed methods of operation were worked out and then imposed on the operating and maintenance officers. It was theoretically scientific railroading carried well toward the theoretic conclusion.

There is a difference of opinion yet among railroad men who had occasion to keep closely in touch with Chicago Great Western affairs during the Stickney regime as to how successful these operating methods were. The Chicago Great Western is exposed to the severest sort of competition. The company is still having, even after the reorganization in 1908, a hard time, and it may well be that both the Stickney method of financing a railroad and of operating one, if applied under more favorable conditions, would have been eminently successful.

A. B. Stickney built the Minnesota Central and his name will always be connected with the development of the Iowa corn belt. He believed in the country itself, induced settlers to come into it and induced the investment of eastern and European capital in the country. This was a service which cannot be lightly estimated.

Alpheus Beede Stickney was born at Wilton, Maine, June 27, 1840. In 1871 he became connected with the St. Paul, Stillwater & Taylor Falls, now part of the Chicago, St. Paul, Minneapolis & Omaha, as attorney, general manager and later vice-president. In 1880 he became superintendent of the St. Paul, Minneapolis & Manitoba, now part of the Great Northern. A year later he was made general superintendent on the Canadian Pacific and in 1882 was elected vice-president of the Minneapolis & St. Louis. It was during the years prior to 1882 that he built the Minnesota Central. In 1884 Mr. Stickney was elected president of the Minnesota & Northwestern, and when this was consolidated with the Chicago, St. Paul & Kansas City he became president of the consolidated company. It was under his auspices that the Chicago Great Western was formed and he was chairman of the board of directors from 1892 to 1908 and was president of the company from 1894 to 1900. When bankruptcy came in January, 1908, Mr. Stickney was made receiver.

RAILWAY EXTENSION IN NORWAY.—At a recent conference, attended by government, municipal, railway and other interests, the subject of a new railway line between the south coast of Norway and Christiana was discussed. The proposal is that the line should run from Christiana to Kristianssand in the south and connect by steamship service in Denmark. The Danish port suggested is Hirtshels on the west coast of Jylland. At present Hirtshels does not possess the requisite port accommodation and facilities, and it also lacks adequate inland communications, but as the Danish government shows an interest in the scheme, it is not thought that there will be any serious obstacle to the provision of all that may be necessary. With passenger boats capable of 16 knots, the distance from Kristianssand to Hirtshels could be traversed in five hours. The route would reduce the journey from Christiania to Paris by four hours, and the journey from Christiania to London would be reduced from 46¾ hours via Bergen to 41¼ hours via Kristianssand. Apart from foreign communication, the proposed railway would be of great benefit to southern Norway, which greatly needs improved communications.

Efficiency Testing on the Pennsylvania

Some of the Results of the Outdoor Work of 29 Inspectors of Train Service on the Schuylkill Division

EFFICIENCY testing in the train service—the careful and methodical inspection of the work and the conduct of enginemen, firemen, conductors, brakemen, station agents, operators and section foremen—under a permanent plan, is now generally recognized as an essential element in safe railroading; and the feeling which prevailed in former years that—except in occasional instances—the superintendent could depend on the men, if they had been well brought up, to discipline themselves, is seen to be a very superficial and inadequate view.

Efficiency testing is important everywhere, on large roads and on small. Indeed, the adoption of systematic testing in the railway service is only following the lessons of centuries of experience with the armies of the world. In the railway service it is peculiarly necessary because large numbers of men are trusted to perform duties of the weightiest importance while they are far from the eye of their master.

An illustration of the value of tests on a small road was given in the *Railway Age Gazette* of July 28, in the article by H. E. Haanel, of the Canadian Pacific. The Canadian Pacific is not to be classed among the small roads; but it is like them, on large sections of its lines, in that the number of trains in operation and of men in service is small in proportion to the extent of territory.

The present article deals with a road of dense traffic, the Pennsylvania. The large table, headed 686 c, "Summary of Failures" deals with the whole of the Pennsylvania Railroad proper and the whole of the Philadelphia, Baltimore & Washington and the West Jersey & Seashore; and the same is true of forms 686 A and 686 B; but the rest of the data has to do with the Schuylkill division alone. For the whole of these roads, in February, 1916, the record shows, for the eleven classes (Form 686 A, columns 1 to 11) 3,792 tests, with 43 failures; or a record of 98.8 per cent; and for the 38 classes of "observations" (Columns 1-38, form 686 B) 420,530 observations with 221 failures; or a record of 99.9 per cent. The tests shown on form 686 A have to do mostly with enginemen, but not entirely so. The February report of failures shows infractions of rules under these tests by signalmen, telegraphers and conductors.

Form 686 c is laid before the reader not as a record of bad service, nor even as a list of lessons in regard to good service; for the facts shown are of but small value, in either of those respects, without the collateral information which is shown in the detailed reports and which, of course, would be too voluminous for our present purpose. As a practical matter, data of this kind has its value limited also, except for the superintendent immediately interested, by what is known of the previous records of the same forces of men. The record is shown here simply as an illustration of the way of doing these things which prevails on the Pennsylvania; of the variety of matters that demand the attention of the inspector of train service, and of the different kinds of punishment imposed.

The meaning of the numbers in the second column ("Nature of Test") will be understood by reference to forms 686 A and 686 B. For example: Philadelphia Terminal division, the seventh item, "6" refers to distant switch signals, column 6, form 686 A; fifth item, "34" refers to observations of trains running through crossovers, column 34, form 686 B.

The large tables shown in facsimile are reproduced mainly for the purpose of illustrating the magnitude of the work that is done and the extent of detail which it requires. Comparisons between one division and another, or of the failures in one class as related to those in another (though they have their value for officers of the road, acquainted with all of the qualifying conditions) would be neither practicable nor useful with the data here available. For example, see item No. 4, form 686 B, where the number of observations on the Pittsburgh division was 5,790, while on the Tyrone division it was five. These two divisions, however, are not only widely different in the matter of size, but also in the relative importance of different kinds of traffic and in other conditions.

All of the tables shown are for the month of February, 1916. The salient feature of the record is table 686 c, as above indicated. This shows the failures detected in a month by several hundred inspectors, among thousands of employees, performing millions of operations. Preliminary to this record we have forms 686 A and 686 B which classify the data on which is based the record of efficiency and of failure.

The facsimiles of forms 686 A and 686 B are partial; in their complete form they are too large for reproduction in these pages. From these incomplete reproductions the reader can get an idea of the character of the reports, while for the substance of the data contained in them, for the month under consideration (February, 1916), reference is had to the end of this article, where further explanations are given.

The Schuylkill Division

Turning now from the broader aspect of this work to the more detailed study of a single division we find that in a typical month (not February) observations were made by 29 men, as shown below. Mr. Strebig, the one first named in the list made 64 tests (48 by day and 16 by night) of the classes recorded on form 686 A. All of the rest of the figures represent "observations." Of these observations, 11,771 by day and 3,230 by night (see totals of columns in table) were of the classes recorded on form 686 B, while 7,081 by day and 2,928 by night had to do with matters of lesser importance. These less important subjects of observation are enumerated in a list headed "Miscellaneous Efficiency Observations" which will be given in a second article.

The 25,064 observations (which number includes the 64 tests by the inspector of passenger service first above-mentioned) are reported to the superintendent in detail with all necessary data concerning time and place and whatever may be necessary to provide a satisfactory record for inclusion in form 686 c.

Efficiency Tests and Observations, Schuylkill Division, June, 1916

Occupation	Day		Night		Total	Failures
	Form 686B	Misc.	Form 686B	Misc.		
Mr. S—Inspector Pass. Service	3,166	2,385	1,113	720	7,448	4
Mr. A—Asst. Train Master	100	...	694	402	1,196	0
Mr. B—Train Despatcher	65	18	...	...	83	0
Mr. C—Train Despatcher	236	36	...	...	272	0
Mr. D—Engine House Foreman	8	19	...	...	27	0
Mr. E—Asst. Train Master	58	82	...	...	140	0
Mr. F—Asst. Yard Master	1,684	...	...	...	1,684	0
Mr. G—Asst. Train Master	1,047	714	3	643	1,907	0
Mr. H—Yard Master	221	...	27	...	248	0
Mr. I—Division Operator	86	126	21	4	237	0
Mr. J—Asst. Yard Master	73	...	...	...	73	0
Mr. K—Ex. Train Despatcher	124	355	14	3	496	0
Mr. L—Ex. Asst. Yard Master	770	...	...	...	770	0
Mr. M—Ex. Train Despatcher	239	33	...	...	272	0
Mr. N—Train Despatcher	78	43	...	...	121	0
Mr. O—Supervising Agent	1,069	1,020	873	529	3,591	0
Mr. P—Asst. Train Master	310	1,147	6	...	1,463	0
Mr. Q—Train Despatcher	130	118	...	...	248	0
Mr. R—Train Despatcher	152	36	...	...	188	0
Mr. S—Train Despatcher	84	42	...	...	126	0
Mr. T—Asst. Yard Master	1,219	...	...	325	1,544	0

EFFICIENCY TESTS AND OBSERVATIONS, SCHUYLKILL DIVISION, JUNE, 1916—CONTINUED

Occupation	Day		Night			Failures
	Form 686B	Misc.	Form 686B	Misc.	Total	
Mr. U—Asst. Road Foreman of E.	276	145	143	29	593	0
Mr. V—Supervisor	92	240	...	...	332	1
Mr. W—Asst. Yard Master	15	21	...	...	36	0
Mr. X—Traveling Engineman	95	37	151	28	311	0
Mr. Y—Ex. Train Despatcher	374	47	244	70	735	0
Mr. Z—Engine House Foreman	...	...	20	8	28	0
Mr. AA—Asst. R. F. E.	200	127	11	3	341	0
Mr. BB—Master Mechanic	...	290	...	164	454	0
Totals	11,771	7,081	3,220	2,928	25,064	5

The Schuylkill division consists of 111 miles of road, of which 66 miles is single track. There is a superintendent, one trainmaster, six assistant trainmasters, one road foreman of engines, two assistant road foremen, a traveling engineman and an inspector of transportation.

The train forces consist of 86 enginemen (23 passenger and 63 freight), 87 firemen, 67 conductors (23 passenger and 44 freight), 25 baggageman, and 236 brakemen.

Tests with fixed signals on this division are made by or under the direction of Ira I. Strebig. They are made from time to time on such enginemen as are selected by him. A list is kept of the names of all of the runners, passenger, freight and switching, and the inspector must see that none are overlooked. With manual block signals, the inspector first gives the signalman a written notice to hold a certain signal in the stop position for a certain train. After a train has been brought to a full stop, he allows it to proceed. The inspector in the meantime has placed himself in a position to see whether or not the signal is overrun. If it should be overrun, he immediately calls the engineman's attention to the situation and notes the exact distance.

With automatic signals, the inspector puts the signal in the stop position. Tests with distant switch signals are made by having a signal maintainer place the signal in the caution position, removing the switch lamp by day or extinguishing the light in the lamp at night. The inspector places himself in a position to see exactly what the passing engineman does. If a distant switch signal wrongfully shows caution, the engineman must stop and note the condition of the switch, the switch lock and the switch lamp; and must make a suitable report to the superintendent at the first convenient point.

Tests with fusees are usually made at the approach to a curve; but if a test is made on a curve, or if, in foggy weather, one is made either on a curve or on a straight line, torpedoes are put down some distance in the rear so as to give the engineman time to slacken speed before he sees the fusee. The engineman must stop and pick up the fusee, and then proceed with caution; and if a fusee is found between the two main tracks, he must stop and pick it up and place it on the other track. Where an engineman is tested with torpedoes, the inspector notes if he closes his throttle and makes a visible reduction of speed.

Block signal operators and trainmen are tested by removing one of the markers from the rear end of a train. The inspector notes what block stations and trains are passed by such a train and then calls on the train despatcher to see

FORM 876B—PENNSYLVANIA RAILROAD, SCHUYLKILL DIVISION—EMPLOYEES' REGISTER

The undersigned certify they have been off duty the number of hours as required by law, and during that time have taken the proper amount of rest and are now in condition for duty

Date	Train or Crew	Time Ordered for or Time Required to Register	ENGINEMAN	Time Registered	Last General Order Signed	Witness	FIREMAN	Time Registered	Witness	REMARKS
6/29/16	SL86	10.00a.m.	R.M. Grieves	9:50a.m.	W11t	Nagle	M.R. Beaver	9:50a.m.	Nagle	

FORM 686 A—PENNSYLVANIA RAILROAD; SUMMARY OF EFFICIENCY TESTS FOR MONTH OF FEBRUARY, 1916.

DIVISION	Home or Advance Signal at Stop and Distant Signal at Caution (1)		Home or Advance Signal at Stop (No Distant Signal). (2)		Automatic Signal at Stop. (3)		All other Stop Signals. (4)		Signal Lights not Lighted. (5)		Distant Switch Signal at Caution (6)		Permissive Aspect Displayed to Trains that should not accept it. (7)		(SEE NOTE)		TOTAL			
	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Percent. Effy.	
Manhattan	4	-	-	-	6	-	-	-	3	-	-	-	-	-			90	-	100	
New York	10	-	2	-	59	-	25	-	4	-	2	-	-	-			139	-	100	
Trenton	20	-	22	-	6	-	6	-	10	-	18	-	14	-			181	-	100	
W. J. & S.	20	-	36	-	6	-	19	-	4	-	4	-	-	-			112	-	100	
Philadelphia Term.	15	-	7	-	18	-	40	-	19	1	1	-	1	-			128	5	96.1	
Philadelphia	27	-	3	-	36	-	38	-	8	-	7	2	-	-			145	2	98.6	
Cresson	-	-	34	-	-	-	-	-	15	-	4	-	8	-			142	-	100	
Middle	53	-	3	-	32	-	33	-	10	8	10	1	6	-			170	10	94.1	
Schuylkill	11	-	-	-	5	-	-	-	5	-	2	-	-	-			36	-	100	
Bellwood	9	-	7	-	-	-	1	-	7	-	1	-	2	-			45	-	100	
Bedford	-	-	12	-	-	-	-	-	10	-	2	-	3	-			45	-	100	
Tyrone	6	-	34	-	-	-	-	-	19	-	9	1	-	-			93	1	98.9	
Pittsburgh	105	-	38	-	240	3	48	-	18	1	26	-	16	-			714	11	98.5	
Conemaugh	41	-	44	-	21	-	12	-	4	-	13	-	2	-			188	-	100	
Monongahela	59	-	12	-	24	-	-	-	21	3	7	-	6	-			149	3	98.0	

Note.—In place of the eighth column which here is shown blank, the statement contains four columns, namely: Fusee; Torpedo; Absence of Markers; Blue Signal.

FORM 686B—PENNSYLVANIA RAILROAD; SUMMARY OF EFFICIENCY TESTS FOR MONTH OF FEBRUARY, 1916—(See Explanations in Text)

DIVISION	Enginman's observance of Flagman's signal (1)		Flagman's performance (2)		Prompt return of fixed signal to stop after passing of train. (3)		Conformity to regulations as to inflammables. (4)		Leaving or arriving ahead of time. (5)		Whistling to call attention to rule carried. (6)		Car doors not properly closed (7)		Display of train order signal (8)		Conformity to speed regulations (9)		Rule 3 Comparing watches with standard time. (10)		Rule 7 Signal appliances to be kept in condition ready for immediate use. (11)		Rule 9 Night signals displayed from automobiles during the day when weather conditions require day signals (12)		Rules 10, 14, 16 and 17 Proper use of signals. (13)		Rule 18 Display of white lights on rear of yard engines (14)	
	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures	Number made	Failures
Manhattan	11	-	21	-	85	-	1410	6	170	-	-	-	1210	-	-	-	4	-	80	-	85	-	768	-	710	-	62	-
New York	3	-	301	1	12	-	25	-	200	-	-	-	2805	-	-	-	173	-	9	-	43	-	75	-	14	-	3	-
Trenton	25	-	258	-	871	1	110	5	534	-	27	-	1176	4	54	-	217	-	17	-	25	-	100	-	18	-	11	-
W. J. & S. R. R. and Cam. Term.	12	-	106	-	199	-	-	-	12	-	-	-	2137	-	14	-	104	-	8	-	49	-	41	-	121	-	14	-
Philadelphia Terminal	2	-	7	-	216	-	135	-	355	-	-	-	1473	-	8	-	95	1	152	-	36	-	133	-	750	-	157	-
Philadelphia	15	-	239	1	39	-	268	-	1109	-	-	-	6767	-	9	-	137	4	166	-	74	-	127	-	150	-	3	-
Cresson	36	-	171	-	182	-	13	-	186	-	24	-	377	-	17	-	78	-	102	-	297	-	87	-	578	-	3	-
Middle	9	-	125	3	57	-	88	1	960	-	-	-	1212	-	12	-	1566	-	186	-	238	-	171	-	968	-	180	-
Schuylkill	368	-	921	-	2459	-	99	-	819	-	-	-	3041	-	146	-	385	-	185	-	250	-	757	-	1163	-	95	-
Bellwood	11	-	24	-	208	-	4	-	256	-	-	-	222	-	13	-	11	-	30	-	18	-	89	-	40	-	3	-
Bedford	11	-	75	-	58	-	3	-	202	-	-	-	84	-	18	-	85	1	22	-	40	-	26	-	318	-	-	-
Tyrone	27	-	53	-	74	-	5	-	56	-	-	-	2001	-	47	-	15	-	72	-	37	-	19	-	13	-	26	-
Pittsburgh	1065	-	3325	4	731	-	5790	-	3754	-	-	-	103605	4	340	-	2684	1	318	-	4400	-	10606	2	20741	4	66	-

if all of the signalmen and trainmen have reported the absence of the marker.

And so on through the whole list. The modus operandi of most or all of the other tests is sufficiently indicated by the titles, as given below. The quality and the usefulness of any test must depend, of course, on the personality of the officer making it; and by way of throwing light on this aspect of the problem we have asked the inspector of passenger service on the Schuylkill division, I. I. Strebig, to write a brief sketch of his experiences; and this will be given in our second article. Suffice it to say, for the present, that the officers of the road believe that the number and character of the tests made are such as to warrant the conclusion that their essential purpose, that of keeping the men alert, is accomplished. This is the point at issue in any operations of this kind, on any railroad. Tests made infrequently or without due care are pretty likely to be ineffective. To have them made, on the other hand, in sufficient frequency and variety to provide a complete check—as a piecework inspector would do in a machine shop or a shirt factory—is out of the question. The golden mean is attained when all has been done that can be done to educate and stimulate the intelligence and the consciences of the individual employees. We have said that the men are kept alert—that this is the desideratum. More accurately it should be said that the object is to have men who will be alert and will constantly desire to be alert. Men, in any line of work, who are kept alert by fear—or who feel any unfriendliness toward the supervisor or inspector—are not reliable except while they are under the superior's eye; and in the train service such surveillance is, of course, out of the question.

Inspector Strebig keeps in constant touch with the trainmen, especially the enginemen, and recently has noted the answers of the runners to the direct question how they liked the tests; whether they looked upon them as a good thing for themselves; and he records 92 per cent of the answers as favorable.

One of the things employed to keep trainmen alert and efficient is a register, always in charge of a competent representative of the trainmaster or the division master mechanic, on which each conductor, brakeman, engineman and fireman must sign his name when he begins his day's or night's work. A sample page of the register for enginemen and firemen is shown herewith (form 876 B).

Another element in the means employed for promoting carefulness is the posting of bulletins explaining briefly the causes of accidents, large and small. Following are two examples of these bulletins:

READING, PA., April 20, 1916.

NOTICE

Brakeman's toes broken and foot contused, due to conductor failing to assure himself that switches were properly set for movement, resulting in brakeman's foot being caught between engine step and rail in track when engine derailed at derail.

G. R. SINNICKSON,
Superintendent.

READING, PA., May 6, 1916.

NOTICE

Conductor assumed position between two cars and, also, between cars and transfer platform, instead of on opposite side of track, where there was sufficient clearance, with the result that he was injured, due to being caught between cars and platform when draft moved.

J. J. RHOADS,
Superintendent.

FORM 686A

Form 686 A, the smaller of the two reports shown in facsimile, contains data from 25 divisions of the road. The fifteenth, shown in the illustration, the Monongahela, is followed by the Renovo, the Williamsport, the Sunbury, the Baltimore, the Elmira, the Buffalo, the Allegheny, the Maryland, the Media and the Delaware divisions. There are eleven tests which are covered by this form, but the last

FORM 686c—PENNSYLVANIA RAILROAD—SUMMARY OF EFFICIENCY TEST FAILURES, FEBRUARY, 1916

Division	Nature of test (See Forms 686A, 686B)	Tests: Number made	Tests: Failures	Observed in service: Number made	Observed in service: Failures	Nature of failure or irregularity	Discipline imposed
Manhattan	4	..	..	1,410	6	Lack of information on waybills.....	Clerks cautioned.
New York.....	2	..	..	301	1	Improper flagging.....	Flagman's attention called.
New York.....	15	..	..	489	4	Markers improperly displayed.....	One conductor and two flagmen reprimanded; top light defective; repairs made.
New York.....	33	..	..	1,379	2	Not properly calling signal indications.....	Two firemen instructed.
New York.....	34	..	..	15	1	Exceeded speed 11.7 m. p. h.....	Engineman reprimanded.
New York.....	26	..	..	152	2	Defects found after regular inspection.....	Inspector suspended one day.
Trenton	3	..	..	871	1	Failed to return signal to normal position at once....	Signalman reprimanded.
Trenton	4	..	..	110	5	Not properly placarded, endorsed and sealed.....	Five agents reprimanded.
Trenton	7	..	..	1,176	4	Freight car doors open enroute.....	Four conductors' attention called.
Trenton	36	..	..	214	32	Defects of minor character. Repairs made before being put in service.	None recommended.
Phila. Term.....	5	19	1	...	..	Failed to recognize imperfectly displayed signal.....	Engineman suspended seven days.
Phila. Term.....	8	4	1	...	..	Failed to observe fusee.....	.....
Phila. Term.....	10	8	3	...	..	Failed to notice absence of markers.....	Three towermen's attention called.
Phila. Term.....	9	..	..	95	1	Exceeded speed	Engineman's attention called.
Phila. Term.....	34	..	..	96	2	Exceeded speed	Two enginemen's attention called.
Phila. Term.....	37	..	..	37	2	Exceeded speed	Two enginemen reprimanded.
Philadelphia	6	7	2	...	..	Failed to stop and examine switch. Failed to see position of switch. Failed to stop and examine switch.	One engineman suspended four days; one engineman suspended two days; one fireman suspended two days.
Philadelphia	2	..	..	239	1	Failed to properly protect train.....	One flagman suspended two days.
Philadelphia	9	..	..	137	4	Exceeded speed limit 12, 9.4, 9 and 9 m. p. h.....	Three enginemen reprimanded, one engineman suspended two days.
Philadelphia	27	..	..	82	1	Failed to lower gates.....	Watchman suspended one day.
Philadelphia	37	..	..	39	3	Exceeded speed 15 and 10 m. p. h.....	One engineman reprimanded, two enginemen cautioned.
Middle	5	10	8	...	..	Failing to comply with Time Table Rule 223.....	Five enginemen cautioned, one engineman suspended two days, one engineman suspended one round trip, one conductor reprimanded.
Middle	6	10	1	...	..	Losing time unnecessarily.....	Engineman reprimanded.
Middle	8	8	1	...	0	Failing to comply with Time Table Rule 111.....	Engineman reprimanded.
Middle	2	..	..	125	3	Failing to have train properly protected. Failing to properly protect train.	One conductor reprimanded, one flagman suspended one week and warned; one flagman reprimanded
Middle	4	..	..	88	1	Having car in train improperly carded.....	One conductor reprimanded.
Schuylkill	32	..	..	620	5	First aid equipment not in proper condition.....	Attention called.
Bellwood	27	..	..	25	1	Allowed unauthorized persons in watch house.....	Watchman reprimanded.
Bellwood	28	..	..	99	1	Walking with current of traffic on double track.....	Track walker reprimanded.
Bellwood	36	..	..	519	2	Failed to make proper repairs.....	Employees suspended two days each.
Bedford	9	..	..	85	1	Exceeded speed limit.....	One engineman and one conductor reprimanded.
Tyrone	6	9	1	...	..	Failure to observe distant switch signal at caution and target removed from switch stand.	Freight engineman reprimanded and warned.
Pittsburgh	3	240	3	...	..	Ran past signal in the stop position.....	Three engiremen suspended two days each.
Pittsburgh	5	18	1	...	..	Ran past signal with light obscured.....	One engineman suspended 14 days.
Pittsburgh	8	56	1	...	..	Overran fusee signal.....	One engineman suspended two days.
Pittsburgh	9	132	6	...	..	Disregarded torpedo signals.....	Three engiremen cautioned, three censured.
Pittsburgh	2	..	..	3,325	4	Failed to protect trains.....	One conductor suspended 14 days, one brakeman and flagman suspended four days each, one flagman suspended six days and one flagman suspended two days.
Pittsburgh	7	..	..	103,605	4	Car doors open while passing over road.....	Two conductors cautioned.
Pittsburgh	9	..	..	2,684	1	Exceeded minimum running time between stations....	One engineman cautioned.
Pittsburgh	12	..	..	10,606	2	Headlights burning in daylight.....	One engineman cautioned and one censured.
Pittsburgh	13	..	..	20,741	4	Failed to sound whistle for road crossing.....	Four enginemen censured.
Pittsburgh	15	..	..	9,402	2	Failed to display decklight at night.....	Two flagmen cautioned.
Pittsburgh	25	..	..	930	5	Failed to conform to code prescribed in current time table.	Four conductors censured; one conductor cautioned.
Pittsburgh	26	..	..	9,317	2	Marked up time of registering incorrectly.....	One brakeman censured, one conductor cautioned.
Pittsburgh	31	..	..	8,253	1	Failed to make road air brake test after taking water..	One conductor suspended two days.
Pittsburgh	34	..	..	249	3	Exceeded speed 8.3 m.p.h.; 2 exceeded speed 10 m.p.h..	Two enginemen cautioned, one engineman suspended two days.
Conemaugh	9	..	..	29	4	Exceeded speed 6 m. p h.....	Four engiremen cautioned.
Conemaugh	36	..	..	143	2	Improper inspection.....	Two car inspectors cautioned.
Monongahela ...	5	21	3	...	..	Did not observe absence of signal light.....	One freight engineman suspended two days, two passenger enginemen suspended one week each.
Monongahela ...	2	..	..	114	3	Three freights insufficiently protected.....	Two flagmen cautioned, one flagman censured.
Monongahela ...	4	..	..	26	3	Three cars of explosives in improper position in train.	Two conductors censured; one conductor cautioned.
Monongahela ...	7	..	..	1,807	28	Four conductors had 28 car doors open in trains.....	Four conductors cautioned.
Monongahela ...	9	..	..	53	1	Freight extra made excessive speed, derailing car.....	Engineman suspended one week.
Monongahela ...	12	..	..	164	1	Switch light not burning, due to being defective.....	Corrected.
Monongahela ...	15	..	..	208	2	Two freight extras had improper rear ends.....	Two flagmen cautioned.
Monongahela ...	16	..	..	21	2	Did not have blue flags in position.....	Two piecework inspectors cautioned.
Monongahela ...	33	..	..	496	1	Fireman failed to call signals.....	Fireman cautioned.
Monongahela ...	36	..	..	9,233	12	Two improper wording on cards. Five wrong repairs made. Wrong price and wrong extension on card. Tools not in order and scrap lying in yard. Wasting steam, connection loose.	Piecework inspector cautioned; three car repairers cautioned; clerk and piecework inspector cautioned; two gang leaders cautioned; boiler washer cautioned.
Monongahela ...	37	..	..	196	1	Exceeded speed limit on curve.....	Engineman cautioned.
Renovo	2	..	..	272	2	Flagman went back but 5 car lengths, from which point his view was obstructed by curve. Flagman failed to go back promptly after train stopped.	Flagman suspended two weeks; flagman suspended one week.
Renovo	29	..	..	53	1	Passed stop signal.....	Passenger conductor reprimanded.
Renovo	37	..	..	23	1	Exceeded speed 15 m. p. h.....	Engineman's attention called.
Williamsport ...	5	18	2	...	..	Failed to report absence of switch light.....	Two engiremen suspended two days each.
Williamsport ...	6	10	2	...	..	Failed to stop and examine switch.....	Two engiremen suspended two days each.
Williamsport ...	35	..	..	40	2	Exceeded speed	Two engiremen suspended two days each.
Sunbury	2	14	1	...	..	Overrunning stop signal.....	One freight engineman suspended 30 days.
Sunbury	5	48	1	...	..	Block signal light not burning and train in block which required protection.	One telegraph operator suspended four days.
Sunbury	10	8	4	...	..	Failure to note passenger train without markers.....	One telegraph operator reprimanded; one suspended one day; one reprimanded.
Sunbury	2	..	..	1,794	1	Failure to protect light engine.....	One freight engineman suspended four days.
Sunbury	3	..	..	581	2	Failure to return fixed signal to stop.....	One telegraph operator reprimanded; one suspended two days.
Sunbury	4	..	..	46	1	Hauling car cement, placarded "Acid".....	One freight conductor cautioned.
Sunbury	7	..	..	2,591	1	Box car door open.....	One freight conductor attention called.
Sunbury	8	..	..	81	3	Failure to display train order signal when required. Improper display of signal.	One telegraph operator suspended five days; two telegraph operators reprimanded.
Sunbury	8	..	..	82	1	Exceeding speed in city limits.....	One passenger conductor suspended one day.
Sunbury	12	..	..	44	1	Failure to display night signals when weather conditions required it.	One freight conductor reprimanded; one freight flagman reprimanded.

Sunbury	13	..	..	4,304	9	Failure to ring bell passing trains. Failure to sound road crossing signal. Unnecessary whistling.	One passenger engineman reprimanded; one passenger fireman reprimanded; two passenger enginemen's attention called; one freight engineman reprimanded, one cautioned; three attention called.
Sunbury	15	..	..	595	2	Failure to properly display markers	One freight engineman suspended two days; one freight flagman reprimanded.
Sunbury	16	..	..	110	3	Failure to display blue signal	Three car inspectors suspended one day each.
Sunbury	22	..	..	144	1	Failure to return switch to normal after use	One freight brakeman reprimanded.
Sunbury	26	..	..	96	1	Failure to sign promptly for general order	One freight conductor and five freight enginemen suspended two days each.
Sunbury	36	..	..	618	4	Imperfect freight car inspection	Seven car inspectors reprimanded; one boilermaker reprimanded.
Baltimore	10	12	1	...	..	Failed to observe absence of markers from train on adjacent track.	Freight engineman and conductor admonished.
Baltimore	7	..	..	1,997	6	Box car doors open	Taken up for correction.
Maryland	2	..	..	485	4	Improper flagging	One flagman suspended two weeks; two flagmen suspended one week; one flagman suspended two days.
Delaware	28	..	..	345	1	Track laborer failed to clear track promptly upon approach of train in accordance with instructions of assistant foreman.	One laborer reprimanded.

four are omitted from the facsimile. The complete list is as follows:

1. Home or Advance Signal at Stop and Distant Signal at Caution.
2. Home or Advance Signal at Stop (No Distant Signal).
3. Automatic Signal at Stop.
4. All other Stop Signals.
5. Signal Lights not Lighted.
6. Distant Switch Signal at Caution.
7. Permissive Aspect Displayed to Trains that should not accept it.
8. Fusee.
9. Torpedo.
10. Absence of Markers.
11. Blue Signal.

The totals of these columns in the February report are as follows: (1) 566—0; (2) 471—1; (3) 559—3; (4) 287—0; (5) 312—16; (6) 175—6; (7) 118—0; (8) 253—3; (9) 556—6; (10) 164—8; (11) 385—0. The total number of tests made was 3,792 and the total number of failures, 43; percentage of efficiency, 98.8. Of the 25 divisions, 16 were recorded as 100 per cent efficient.

Form 686B

Form 686B provides for 25 divisions, the same as the form previously mentioned, only thirteen of which, however, are shown in the facsimile. The "observations" provided for in this list differ from the "tests" shown on form 686A in that they have to do only with what is seen by the inspectors during the course of actual operation. The "tests," on the other hand, usually require the manipulation of some mechanical device or appliance whereby the testing officer duplicates actual service conditions.

Form 686B provides for observations under 38 different heads, of which 14 are shown. The other 22 are as follows:

(15) Rules 19, 19A, 19B, 20 to 24A.—Proper display of markers and classification signals.
(16) Rule 26—Proper display of blue signal.
(17) Rules 83 and 83A. Trains before leaving initial starting points ascertaining first whether all superior trains due have arrived or left.
(18) Positive identification of trains at meeting points.
(19) Rule 100—Brakeman taking the place of flagman when latter goes back to protect train.
(20) Rule 102—When cars are pushed by an engine, a trainman to take conspicuous position on front of leading car.
(21) Rule 102A—When shifting over unprotected crossings, trainmen to be stationed on crossing to warn persons using same.
(22) Rule 104—Switches left in proper position after having been used.
(23) Rule 104A—All switches of any cross-over to be secured in the normal position when trains are waiting to cross.
(24) Rules 152 and 503F—Protecting before crossing over or obstructing tracks and seeing that all switches of cross-over are open before making cross-over movement.
(25) Rules 316 and 416—Proper use of communicating code.
(26) Regs. 703 and 718—Examination of Bulletin Boards by conductor and enginemen.
(27) Reg. 731—Crossing watchmen; observance of regulations governing.
(28) Reg. 728—Men working on or about tracks; observance of regulations governing.
(29) Reg. 703—Conductor comparing time with engineman and ascertaining if he has copy of latest time table before starting trip.
(30) Reg. 707—When shifts are to be made, conductor notifying all persons in vicinity of cars of such intention.
(31) Rule——Road and Terminal air-brake test.
(32) First aid equipment properly distributed and in proper condition.
(33) Regs. 718 and 719: Enginemen and Firemen calling indication of fixed signals and protecting when necessary.
(34) Speed of trains over cross-overs (exclusive of other observations as to speed, reported on C. T. 685).
(35) Speed under permissive signal (exclusive of other observations as to speed, reported on C. T. 685).
(36) Locomotive; Passenger and Freight equipment inspection.
(37) Speed of trains around curves (exclusive of other observations as to speed, reported on C. T. 685).
(38) Obstructions of track without proper protection when renewing ties, rails, splices, frogs and switches and when gaging and raising track.

The totals of the 38 columns in the report on observations for the month of February are as follows:

Column	Observations	Failures	Column	Observations	Failures
1	2,790	0	21	1,963	0
2	10,517	19	22	5,030	1
3	9,131	3	23	1,490	0
4	10,839	16	24	1,388	0
5	13,004	0	25	3,891	5
6	488	0	26	12,297	3
7	143,532	43	27	5,942	2
8	1,714	3	28	42,048	2
9	7,540	13	29	1,612	1
10	2,474	0	30	583	0
11	7,014	0	31	13,231	1
12	15,171	4	32	3,697	5
13	33,750	13	33	23,032	3
14	1,003	0	34	2,250	6
15	18,809	10	35	510	2
16	3,105	5	36	13,874	54
17	1,055	0	37	2,893	7
18	514	0	38	233	0
19	292	0			
20	3,824	0	Total	420,530	221

In a second article there will be given the paper above referred to, by Mr. Strebig, and also one by Mr. Klingeman, a traveling engineman; and also a supplementary list of different features of the train service which inspectors are to keep in mind when making observation trips.

IS IT TO BE COOPERATION IN THE FUTURE?*

By Paul H. King
Operating Receiver, Pere Marquette

I do not speak entirely from the railroad man's standpoint, nor altogether from that of the layman, but rather from a combination of the two. Before my connection with the railroad, I of course knew in a general way about our great system of transportation, the greatest in the world, but I knew practically nothing of the details incident to it. Now I have come to appreciate some of the difficulties with which railroad men contend. I feel particularly fortunate in thus being able to view the situation from a double viewpoint. I have striven to retain the one while acquiring the other, and the impressions I have received are, therefore, to me the more valuable.

I have been impressed in the first place with the magnitude of the railroad industry and the fact that it touches the lives and interests of nearly everyone in this great nation of ours. As President Elliott, of the New Haven, so well pointed out in his masterly address before the National Chamber of Commerce at Washington not long ago, the greater part of our population is either directly or indirectly concerned in the welfare of the railroad. There are approximately 1,800,000 railroad employees. Assuming that there are on an average four other persons dependent upon each

*From an address delivered at the annual convention of the Association of American Railroad Accounting Officers at Detroit.

employee, we have 9,000,000 people who are directly concerned. To these must be added the 1,000,000 employees of industries which furnish materials and supplies, which turn out steel rails, which operate coal mines, etc., and those who are dependent upon them. This increases the number by 5,000,000, or a total of 14,000,000 people, whose daily bread and butter depends upon the welfare of the railroad. In addition to these, there are 1,500,000 security holders and those who are dependent upon them, which makes 7,500,000 who are more or less directly concerned. Then we come to those who are indirectly interested, the 11,000,000 depositors in the savings banks of the country which have invested in railroad securities about $800,000,000, and the 30,000,000 policyholders of the insurance companies whose investments total $1,500,000,000. This makes 41,000,000 more people, or a total of 62,500,000, the major portion of our population, to say nothing of the other millions who are affected by the service which is rendered.

I am impressed by the fact that there is scarcely anything that we eat, drink or wear, or the materials for our habitations, which have not at some time or other been transported by the railroad. Railroads are the arteries of transportation through which flow the never ending streams of commerce. When they are prosperous, other industries prosper. When they are in difficulty, all business is detrimentally affected.

I am impressed by the fact that railroad expansion has, for the time being, at least practically ceased; that last year there were constructed in the United States less than 1,000 miles of new track, a less amount than in any other year since the Civil War and in any year since 1848, with the exception of three years during the war. Take our own commonwealth of Michigan. There were but 21½ miles of new main line track built in the whole state during the year 1915—truly not a great development for so prosperous a state as Michigan.

I am also impressed by the fact that during the year 1915 there were more miles of railroad in the hands of receivers than ever before, with the exception of the year 1893, which was a panic year, practically one-sixth of the railroad mileage in the country being administered by the courts. I realize, of course, that during the present year there is apparently an unusual degree of prosperity, and that railroad earnings have shown a marked improvement. I think we will all agree, however, that conditions are abnormal and that it is unsafe to build any hopes or to make any plans on them. We are glad of the increased earnings and, of course, hope that they may continue, but what is going to happen when the war comes to an end no one pretends to know.

I have been impressed by a recent statement of the fact that notwithstanding the railroads of the country last year carried a tonnage exceeding that of eight years ago by 66,000,000,000 ton miles, and additional passengers to the extent of 4,000,000,000 passengers one mile, and that they have increased their investment by $4,800,000,000, the net receipts for 1915 as compared with 1907 were $21,000,000 less. Surely this is a perplexing situation. There are some people who will say that it is due to financial manipulation and mismanagement. These, I am convinced, have given but little serious thought to the matter. At least, I judge so from my experience with the Pere Marquette, with whose affairs you are doubtless somewhat familiar. Perhaps nine out of ten people whom I meet give as the reasons for its condition those which I have named, and while I am convinced that their views are erroneous, I must at the same time concede that in most cases they are sincere. It has been my desire to do what I could to eradicate these beliefs, because they are unjust and work an injury to the railroad. The real reason for the condition of the Pere Marquette today is the fact that it has been trying to operate in a section of the country where the average rate per ton per mile is less than in any other part of the United States, and has been trying to furnish service at rates which are grossly inadequate. Summed up in a word, the trouble is due to comparatively light traffic density and to low rates, coupled with the fact that while rates have remained practically stationary operating costs have advanced tremendously. Since the Pere Marquette was organized sixteen years ago its average rate per ton per mile has decreased more than 30 per cent and the legal rate for the carrying of passengers has been reduced by the same percentage, while taxes and the cost of labor and materials and supplies have increased many fold. While I cannot speak for the other railroads of the country, I apprehend that their situations are not vastly different from ours.

I am a firm believer in regulation. I think it is a good thing for the railroad as well as for the user of railroad facilities. But I have wondered if in the zeal for regulation the pendulum has not been swung too far. The railroad is today the most regulated of industries. There is hardly a phase of operation, accounting or finance, that is not most minutely governed. There is not a rate which is not passed upon not only by a governing board, but by in most cases several governmental bodies. Our railroad, for instance, reports to five state and provincial boards as well as to the Interstate Commerce Commission. There are those who will say that the railroads have brought this condition upon themselves. Whether this be true or untrue, the hope for the future, it seems to me, is in the awakening sense of the people as a whole that regulation is being overdone, and that the ill effects are reacting upon the public generally. It goes without saying that service can be furnished only out of income, and when operation and earning power are regulated to so fine a point that there is not enough margin between income and outgo to encourage the man with money to invest further in railroad securities, and the development of the industry for that reason practically ceases, it is time in the public interest, if for no other, to call a halt.

It is up to you and to me in our several stations to do all within our power to overcome this condition; as accounting officers your part in this work is most important. I was much interested in reading an extract from a letter of Commissioner Harlan to the president of your association some time ago in which he said in substance, "Accounting officers appreciate, of course, the responsibilities and duties which they owe to their several railroads. They also have an important duty to the public to perform. While operating and traffic officers have a large measure of responsibility, the great majority of transactions between shippers and carriers eventuate as accounting propositions, and for this reason accounting officers become to some extent joint administrators with the Interstate Commerce Commission in the enforcement of the act to regulate commerce." This, to me, indicates the importance of your relation to the public, and I would hesitate to set a limit upon your ability to assist in overcoming the lack of a complete understanding between the public and the carriers.

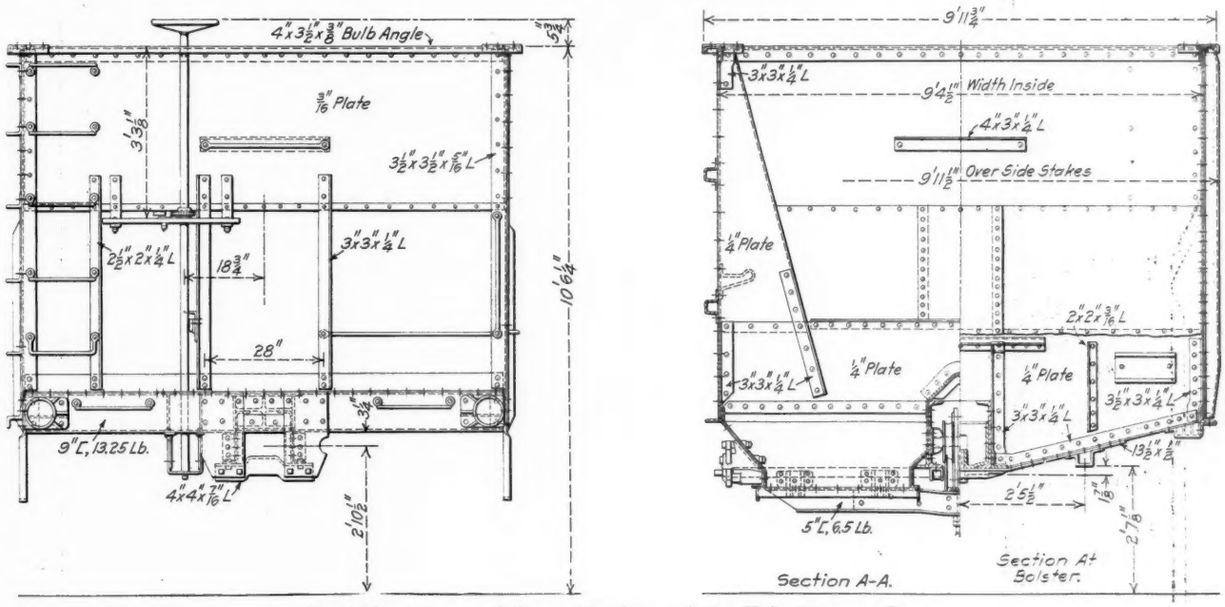
As I read the history of the industry, there seem to me to be three stages of railroad development. The first was the stage in which the railroad was unduly influential. The second, when, as a possible result of this the people generally took hold and said, "We will run the railroads," and the third, the happiest stage, the one upon which I believe we are now entering, in which the antagonisms of the past are being laid aside and the railroads and the public have come to appreciate each other and to realize that the prosperity of the community depends to a very great degree upon the railroad, and that of the railroad upon the community; that their interests are mutual, that what helps one helps the other, and that conversely what hurts one hurts the other. As I look at the situation, this feeling of cooperation is the guaranty of the future.

Erie Railroad 50-Ton Capacity Hopper Cars

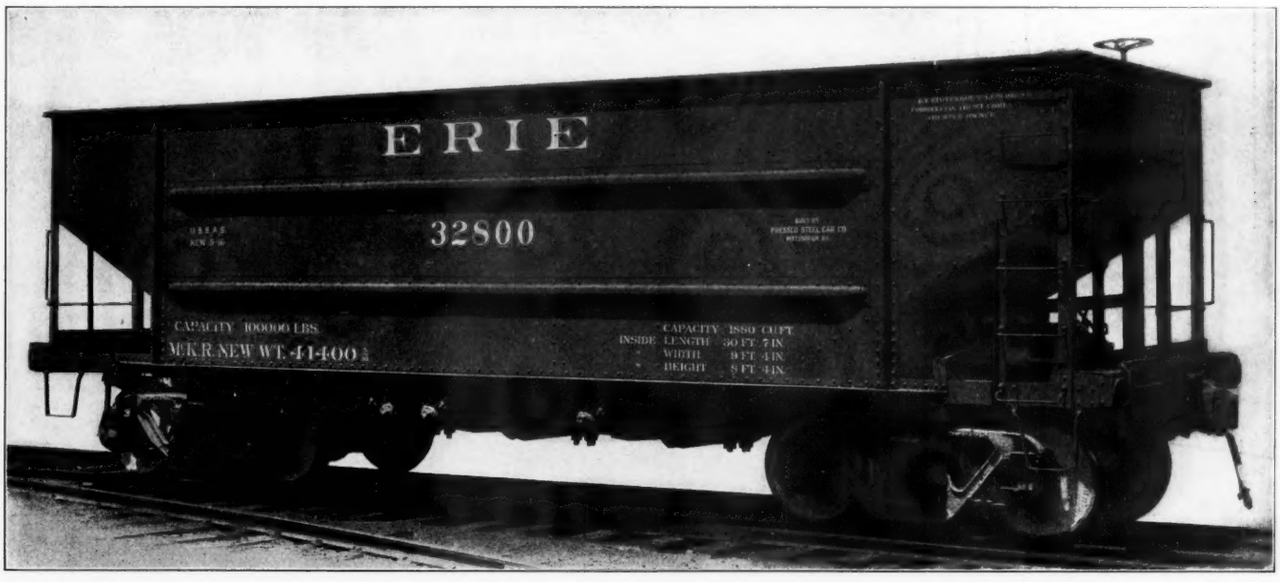
One Thousand Recently Placed in Service Have Three-Hopper Dumping Arrangement; Unusual Side Bracing

THE standard design of car used by the Erie Railroad for transporting coal is a self-clearing triple-hopper-bottom car. By referring to the photograph and drawings of one of these cars, 1,000 of which have recently been built by the Pressed Steel Car Company, it will be noted that the bottom is equipped with three sets of doors. Each opening is provided with two doors hinged crosswise of the car. The doors are opened in multiples of four, that is, two pockets, one on each side of the center sill, are operated from one operating shaft. With this arrangement of hoppers, large and direct openings for discharging the lading are obtained. The total opening is from 30 to 50 per cent greater than with the standard double hopper bottom type of car and, therefore, the lading can be discharged more rapidly and with less labor.

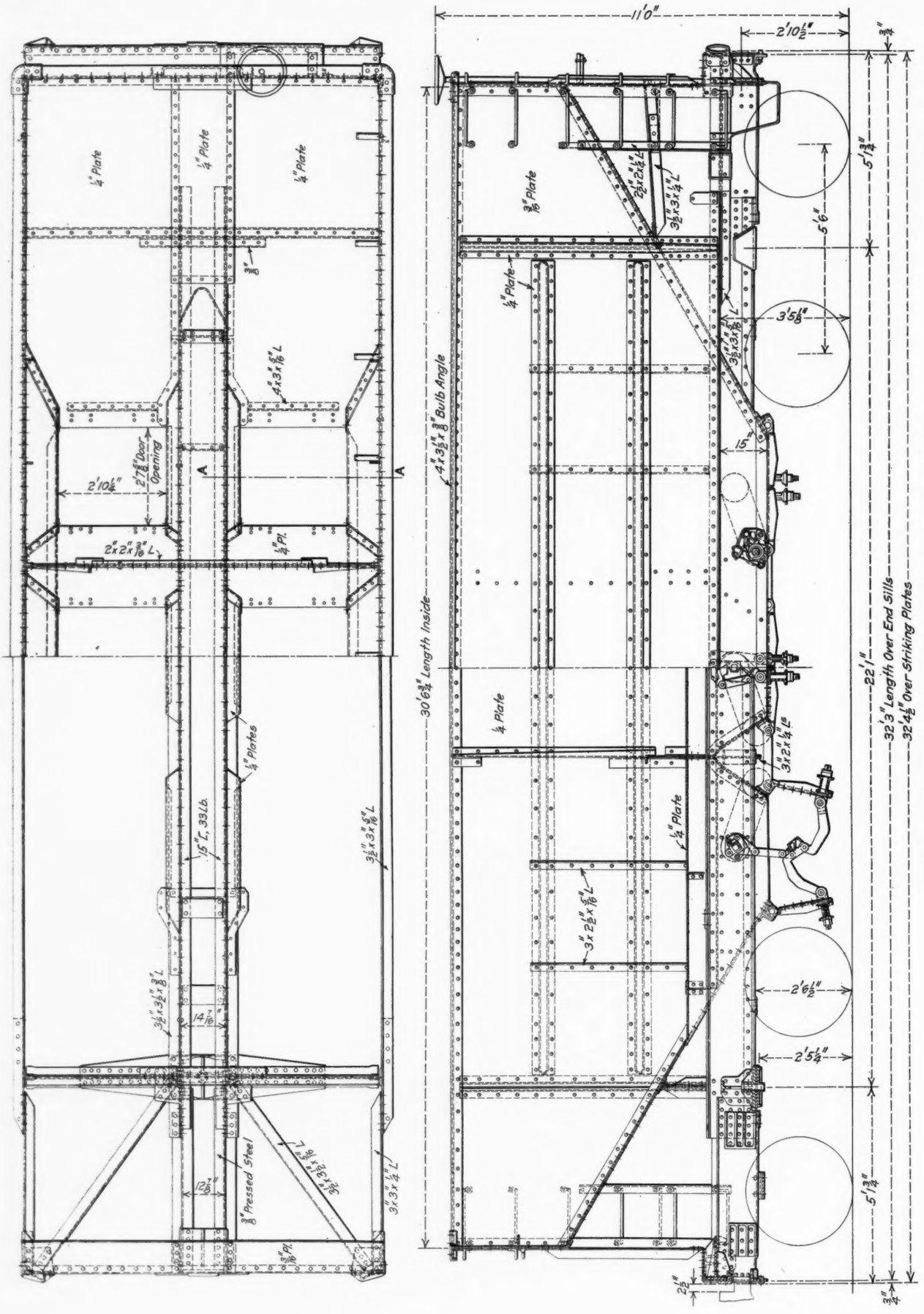
These cars have a special feature in the construction and bracing of the sides. Where outside vertical stakes and inside tie braces tying the sides together are used they are sooner or later damaged, the side stakes from being side brushed and the tie braces from the lading. The sides on these cars are braced differently from the usual practice, and instead of using outside vertical side stakes spaced at regular intervals between the bolsters, and bracing the sides by tying them together with tie braces, the main bracing on the outside is longitudinal and on the inside vertical. There are two



End Elevation and Cross Sections of the Erie Hopper Car



Erie Railroad 50-Ton Capacity Hopper Car



General Arrangement of the Framing of the Erie Hopper Cars

pressed steel stakes on each side, one at each bolster. These two stakes are well braced, being anchored to the end of the body bolster girder. Between the bolsters the sides are braced on the outside with four longitudinal members. One is at the top of the car and consists of a 4 in. by 3½ in. by 1½ in. by ⅜ in. bulb angle, continuous from corner post to corner post. At the bottom of the side is a 3½ in. by 3 in. by 5/16 in. rolled angle continuous between points just beyond each body bolster. Between these two rolled members, and spaced about equally, are two pressed steel stiffeners extending from bolster to bolster. On the inside there are two heavy triangular-shaped gusset plate braces. These extend from the top of the sides to the cross girders and have a width at the bottom of about one-half the distance between the side and center sills. There are four additional vertical stiffeners, made of angles, on the inside and spaced equally between the bolster and the triangular-shaped gussets. It is found that this construction stands up very well and repairs are small when compared to the usual construction of having all vertical side stakes on the outside, and inside cross tie braces.

With the exception of the end sheet, the end side sheet and the end sill cover plates, which are 3/16 in. thick, the plates used throughout are ¼ in The cross ridges, which at the same time form cross girder constructions, each consist of a vertical web plate running from side to side of the car and in depth from the bottom to about 20 in. above the top of the center sills. These are reinforced at the bottom with two angles, extending from side to side, which pass below the center sills, and at the top with an angle extending between the side gusset plates which are attached to the top of these plates. To this plate, about in line with the top of the center sills, are also attached four sheets which slope down to and form one side of the door opening to which the drop doors are hinged.

The center sills consist of 15-in., 33-lb., rolled channels, with the flanges turned in, reinforced at the bottom on the outside with a 3½ in. by 3½ in. by ⅜ in. angle extending from draft rigging to draft rigging. To these sills, in front of the body bolster, are spliced ⅜ in. thick pressed steel draft sills. The body bolsters are of the usual single web construction. The end sills consist of 9-in., 13¼-lb., rolled channels, backed by a heavy steel casting behind the coupler horn striking face.

The specialties used are New York air brakes, Simplex, Gould and National Malleable Castings Company's couplers, Reliable uncoupling device and Miner friction draft gear with forged steel yoke. The trucks are of the cast steel side frame type, having 5 in. by 5 in. by ½ in. spring plank angles, and are equipped with Simplex bolsters having Miner side bearings, M. C. B. brake beams, steel back brake shoes, Barber roller device, cast iron wheels, Gould journal boxes and drop forged wedges.

The length of the car over coupler striking face is 32 ft. 4½ in., the height from rail to top of side 10 ft. 6¼ in. and the width over all 10 ft. ¼ in. The cars are of 100,000 lb. capacity, level full, hold 1,880 cubic feet and have a weight of 41,000 lb.

A Subaqueous Tunnel.—One of the most notable achievements in gas engineering is the successful construction of a subaqueous tunnel connecting Astoria, L. I., with the borough of The Bronx, New York City. The tunnel lies beneath the waters of the East river at an average depth of 225 ft. below mean sea level. It is 19 ft. wide, 18 ft. high and 4,662 ft. long. It accommodates two 72-in. gas mains, with abundant space for other utilities. The route of the tunnel lies through a long stretch of disintegrated rock where the water pressures run up to 95 lb. per sq. in., thus making it impossible to use compressed air to exclude water.—*Jour. Amer. Soc. of Mech. Eng.*

INTERIOR TRANSVERSE RAIL FISSURES*

By P. H. Dudley.
Consulting Engineer, New York Central Lines

My investigations show that interior transverse fissures in rail heads are induced by a combination of two or more exceptional conditions of manufacture in an occasional rail head by direct rolling, which can and should be avoided.

Induced interior transverse fissures in basic open hearth rails are due in part to an occasional hot rail being cooled so rapidly by the rolls and their pressures to elongate the bar, or chilled by gusts of air before recalescence on the hot beds, as to cause a lag of some of the transformations of the metal in the interior of the head. Induced interior transverse fissures can only develop in the track from the effects of preceding causes, either of which is no longer a mystery, and

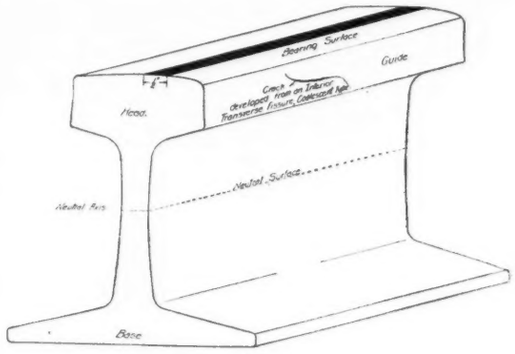


Fig. 1

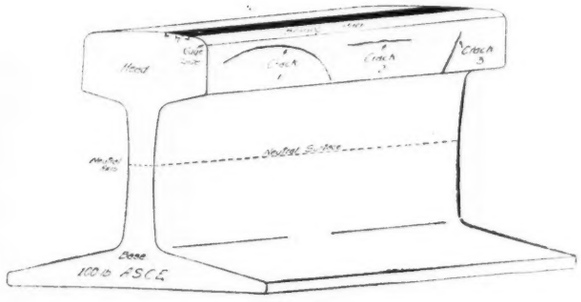


Fig. 2

Coalescent Type of Cracks. Gage Side of the Heads of the Rails

their progressive stages of development occur in the following order.

In manufacture delayed transformations of the metal near the center of the head, and chemical or mechanical defects induce loss of strength, initial strains and physically a nonductile core of heterogeneous metal near the center of the head. Again, mechanical injury to the heterogeneous metal may occur, the nucleus is checked by the gag (Figs. 1 and 2) producing a defect of an interior invisible portion of fractured metal near the center of the head before the rail leaves the steel plant.

In service under abnormal conditions the checked interior metal in either type is no longer able to restrict the strains of the wheel loads within the usual range of elastic limits of the steel as in the case of sound metal. There then develops by detail growth, from and around the checks, the specular surfaces of the induced interior transverse fissures until the section ruptures.

When the induced interior transverse fissures by growth

*Abstract of a report to A. H. Smith, president, New York Central, announcing discoveries and conclusions of the cause and cure of flaws in steel rails.

crack through the metal to the air, the specular surfaces discolor and darken, as found in ruptured rails by the trackmen. Interior transverse fissures have not occurred in the countless thousands of rail heads of physically homogeneous metal for the reason that they do not contain the conditions of the first contributory cause, consequently, while the metal is lengthened or shortened by the second contributory cause, it is not checked.

Basic open hearth rails in the composition of the New

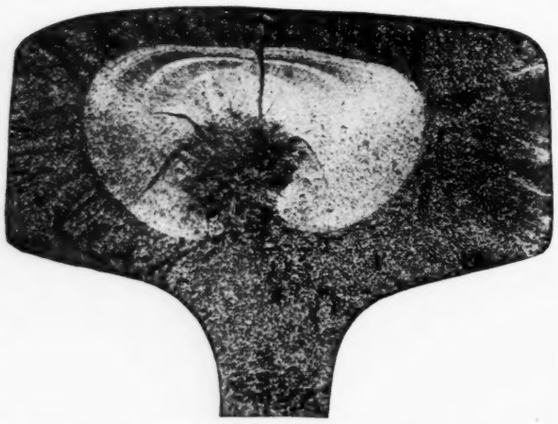


Fig. 3—Induced Interior Transverse Fissures—Intergranular Type. Rolled November 8, 1910; Failed March 5, 1915

York Central Lines specifications and rolled from reheated blooms have not, to date, developed interior transverse fissures. The specimens in my collection, after investigation, I classified by June 9, 1915, into two general types—intergranular and coalescent.

Intergranular.—The nucleus, in effect physically a nonductile core in the head which is checked between the grains of the metal by the gag of the straightening press, may be

Fig. 4—Induced Interior Transverse Fissures. Coalescent Type. Rolled January 12, 1912; Failed January 16, 1915

five-eighths of an inch in diameter, or as small as one-eighth. The subsequent development in the track of this type of interior transverse fissure from the checked nucleus is *through* the grains, a "detail" growth of specular surfaces, in striking contrast to the check *between* the grains, the effect of the blow of the gag. This type develops in rails or part of the rail, which cooled "low" on the "hot beds," and were then gagged upon the base to shorten its metal and lengthen that of the head. (Fig. 3.)

Coalescent.—This is a checked longitudinal elliptical nucleus, the imprint of the gag on the non-ductile metal, one-half to five-eighths of an inch under the bearing surface of the head which enlarges to a longitudinal fissure by the passing wheel loads. This fissure coalesces through a transverse or oblique crack at the side of the maximum shearing stresses produced by the gag, and usually develops after two or more years of service in the track into the nearly vertical interior transverse fissure. The fracture is often conchoidal at the juncture of the coalescence. The longitudinal fissure, and sometimes the vertical, open on the gage side of the head, and can be discovered by careful inspection before rupture of the rail occurs in the track. (See Figs. 1 and 2.) This type develops in rails, or part of a rail, which cooled "high" on the "hot beds," and were then gagged upon the head to shorten its metal and lengthen that of the base below the neutral surface of the section. (See Fig. 4.)

Supervisors should instruct trackmen to distinguish between the induced interior transverse fissures in the rail heads herein described and the now rare surface crack which sometimes occurs where the drivers have slipped on the head of the rail and hardened the metal, and then, by "detail" growth, develops down through the head and web to the base until the section ruptures. Two or more surface cracks may occur in the same rail length at stations and waterplugs. It is now usual to remove rails from the main line tracks where the drivers have slipped on the heads of the rails to a noticeable extent. Such practice is to be commended.

A full discussion of induced interior transverse fissures as a result of rail gagging appeared in the November 26, 1915, issue of the *Railway Age Gazette.* The conclusions shown in this report are the results of further investigations.

BRITISH COAL EXPORTS.—The falling off in British coal exports is becoming more considerable, the shipments in June having been 3,265,698 tons, as compared with 3,557,306 tons in June, 1915, and 5,734,220 tons in June, 1914. For the first six months of this year the aggregate exports were 19,075,461 tons, as compared with 22,332,590 tons, and 34,586,938 tons in the corresponding periods of 1915 and 1914.

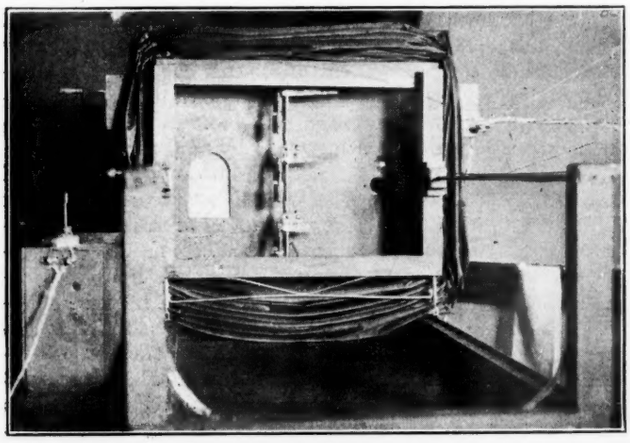
SWISS RAILWAY ELECTRIFICATION.—The general management and the standing committee of the Swiss Federal Railways have just submitted a report to the council of administration in regard to the projected electrification of the Erstfeld-Bellinzona section of the St. Gothard Railway. It is first pointed out that the three-phase system would be unsuitable for the purpose in view, while the advocates of the direct-current method base their contention on experience with lighter trains and pressures far below 3,000 volts. The single-phase system, which is already employed on the Lotschberg Railway, can now be recommended for adoption without reserve. No other electric railway exists which can be placed on an equality in regard to the varied nature of service, the number of locomotives, length of the track and extent of services rendered with that of the New York, New Haven & Hartford. At the same time this railway is the first which, owing to the system used, has proved itself to be extensible at will and capable of being accommodated to all kinds of services. In the case of the Lotschberg Railway, the interruptions in working were attributed chiefly to the difficult circumstances under which the electrical equipment had to be provided. The report also discusses the problem of uniformity in the form of current and periodicity, which it is sought to attain in the distribution of energy throughout Switzerland. The Amsteg and Ritom power stations, which are proposed for the working of the Erstfeld-Bellinzona section, will be able to furnish energy not only for this section, but also for the whole line from Lucerne to Chiazzo, the conversion of which will not be long deferred.—*Railway Gazette, London.*

Scientific Tests on Signal Interpretation*

Psychologists Undertake to Compare Value of Signal Indications and Improve Method of Selecting Engineers

By O. V. Fry

A CAREFUL study of data supplied by the larger roads covering their experience with train accidents shows that 85.3 per cent of all accidents involving signals were caused by misinterpretation, while 14.7 per cent were the result of improper operation of the signals. The records of 72 accidents caused by misinterpretation of signals were further investigated to determine the lines along which scientific tests in this field could be of the greatest value. Following this study a very complete investigation was undertaken to establish, if possible, means for determining the best location for a signal, the best type of signal indication and the best man for the interpretation of signals.



The Apparatus Used for Displaying Signals

Method of Making Tests.

The signals, consisting of miniature lights and semaphores, were displayed at the back of a camera-like apparatus, being controlled electrically by the operator. At the point in this apparatus corresponding to the lens in an ordinary camera provision was made for inserting a ground glass which could be moved toward or away from the signals within the limits of 10 centimeters and 90 centimeters. This provision in connection with smoked glasses enabled the operator to determine experimentally the effect of fog conditions, since the greater the distance of the ground glass from the signals, the greater the fog-like effect. The subject was seated 4.1 meters (about 13½ ft.) from the signals behind a screen and viewed them through a tapered box 10 in. long, the end towards the subject being large enough to permit clear vision and the smaller end 1¼ in. by 2¼ in. opening towards the signals. Below this focus box at a convenient height for operation with the hands were located levers and keys providing two systems of registering the subject's reaction. A registering apparatus was developed by which a sheet of paper 1 ft. wide was moved continuously under a battery of 7 pens, one marking the time in one-tenth seconds, one each for the danger, caution and clear indications as shown by the operator, and one each for a reaction by the subject corresponding to danger, caution, or clear signals. Four types of indications were considered, semaphores and beam lights under daylight conditions and colored lights and beam lights under night conditions. Daylight conditions were simulated by lighting the interior of the signal displaying box by two 40-watt lamps which could be extinguished while a new indication was being set up, thus preventing the subject from seeing the signal change.

*Abstracted from a paper read before the Economic Psychology Association at a meeting held in New York on April 27.

Location of Signals.

While other conditions must determine very largely the location of signals some weight should certainly be given to the range of visibility. For colorless vision, that is, when looking at a white light or a position signal, the limit of visibility extends about 73 deg. above and 54 deg. below the point on which the eyes are focused. This limit is much less, however, for true color vision. If an engineer has his eyes fixed on the track, a red signal 70 deg. above him will appear a dark gray. At 45 deg. from him he may see it as a blue or yellow, depending upon the purity of the color, and only at 25 deg. or less will he see it in its true color. All colors similarly have a limit in which they can be seen in their true value or as some shade of neutral gray.

Comparison of Indications.

The tests on semaphore and beam light signals under daylight conditions indicated that the beam signal will be visible

Subject Making a Correct "Red" Reaction with Levers

under foggy conditions long after the semaphore signal has disappeared. It must be concluded therefore that the beam signal is superior to the ordinary semaphore for daylight indications. While psychologically the best colors for color signals are "plus red," "minus red minus yellow" and white, the ordinary signal green was used in the tests for caution instead of the "minus red minus yellow." The comparison of color light signals and beam light signals under night conditions was favorable to the color signals. It was clearly indicated that a color signal will remain visible in fog and smoke long after other methods of signaling have become useless. It was also indicated clearly that color signals possess a value greater than the night beam signal. While the substitution of the latter would do away with color examinations,

it is a question whether as much can be laid to the door of color as has been hitherto. There is also a question whether we do not have "position weak" people. A combination of the two indications might improve conditions, that is, by providing in the center of the horizontal beam a single red light and in the diagonal beam a green light. While the clear position could not be helped by any color indication the colors would help on the signals which are the most important.

SELECTING ENGINEMEN.

The methods in use at present of selecting new employees from among the applicants for engineers are far from accurate. The practice of depending upon the sizing up of an applicant by a man whose only qualification is that he has succeeded in the position himself cannot be condoned. It does not follow because a man can see well, is in good physical condition and clearly understands the mechanics of a locomotive, that he will be a good engineer. All these things are necessary, but they are only a part of the well rounded whole that defines the requisites of a good engineer. In the ideal mental make-up of a man for this position we demand first and foremost attention. We demand that he must be able to react to color signals within a given time and that his total variations in time must not be more than a given amount; he must not be suggestible, that is, he must not give preference to the audible signal of the fireman over the visual stimulant; he must have the ability to meet new conditions and he must have a high degree of visual acuity. All of these points and others are psychological elements that can best be tested by the use of psychological principles.

The psycho-physiology of the color question is another important and entirely distinct matter. A color test does not indicate that a man possesses the mental qualifications necessary for an engineer, nor will a demonstration of such mental qualifications indicate that he could pass a color test. The color tests in use at present follow in the main the wool and lantern tests. The trouble with all of them is that they test too much that is not really called for in conditions met on the road and not enough attention is given to the differences presented under actual operating conditions. What practical difference does it make whether an engineer can pick out old rose or nile green if he can always correctly interpret the red and green signals under every condition that he may be called upon to read signal indications. Surely a test that would present red, green and white in all possible conditions under which an applicant would have to view them in service and that would determine whether he reacted within a time which would be sufficient for safety on the road would cover all known possibilities.

Tests such as those outlined above would be valuable not only in the selection of men capable of running a locomotive, but even more so in the grading of the men in service. Anything that would tend to place the rating of men on an impersonal basis should be welcomed.

There are two ways to find out whether a man is fitted for the position of locomotive engineer: put him on an engine and find out how many wrecks he will cause or submit him to a series of tests arranged by a psycho-technician. The first is expensive. The second is untried, but surely is less expensive and has behind it the sanction of science. It is realized that much experimental work must yet be done in this field, but the most pressing need is for an application of the methods outlined above in actual service. As defects are located there, they can be taken up in laboratory research and results of definite value to the roads of the country obtained.

RAILWAY FLOOD PROTECTION IN CHINA.—Chinese railroad embankments are protected from floods by planting them with a native grass with tenacious roots that resist erosion.

CONSTRUCTION OF STEAM AND ELECTRIC RAILROAD CARS

A summary of the general results of the 1914 census of manufactures with reference to the construction of steam and electric railroad cars has been issued by the Bureau of the Census, Department of Commerce. It consists of a detailed statement of the quantities and values of the various products manufactured, prepared under the direction of the chief statistician for manufactures.

Returns for 1914 were received from 242 establishments which manufactured 138,178 steam and electric cars, valued at $165,071,427. These totals include figures for 118 railroad repair shops which reported the construction of 11,049 new cars, valued at $12,811,087, and 7 establishments engaged primarily in other lines of manufacture, but which produced 4,481 railway cars, valued at $3,178,677, as subsidiary products. For 1909 there were reported 280 establishments which manufactured 101,243 cars, valued at $102,147,396. Of these 280 establishments, 140 were railroad-repair shops which constructed 14,792 cars, valued at $13,952,923, and 16 were establishments engaged primarily in other industries, but which built 8,981 cars, valued at $5,934,871, as subsidiary products. The number of establishments engaged in this industry thus decreased by 38, or 13.6 per cent, during the five-year period; but the number of cars built increased by 36.5 per cent, while their value increased by 61.6 per cent.

In 1914 there were built 135,357 steam-railway cars, valued at $155,029,539, as compared with 98,471 cars, valued at $94,884,287, built in 1909, the percentages of increase in number and value of annual output being 37.5 and 63.4, respectively. The number of steam passenger cars built in 1914 was 3,558, and their value was $45,027,083. The corresponding product for 1909 was 1,819 cars, valued at $15,120,961. The increase in annual output of such cars during the five-year period amounted to 95.6 per cent in number and 197.8 per cent in value. Of freight and other cars for use on steam railroads, the output in 1914 was 131,799, valued at $110,002,456, the corresponding output for 1909 being 96,652, valued at $79,763,326. The increase amounted to 36.4 per cent in number and 37.9 per cent in value.

The number of electric cars manufactured in 1914 was 2,821, and their value was $10,041,888. In 1909 there were built 2,772 electric cars, valued at $7,263,109. The number of cars constructed was thus only 1.8 per cent greater in the later year than in the earlier, but during the five-year period their value increased by 38.3 per cent. The output of electric cars in 1914 comprised 2,583 passenger cars, 110 freight cars and 128 other cars.

The statistics for 1914 and 1909 with respect to the construction of steam and electric railway cars, whether in establishments engaged primarily in the building of cars, in railroad-repair shops, or in establishments where cars are manufactured only as a subsidiary product, are summarized in the following table:

CONSTRUCTION OF CARS FOR USE ON STEAM AND ELECTRIC RAILROADS—COMPARATIVE SUMMARY: 1914 AND 1909

	1914	1909	Per cent of increase,* 1909-1914
Number of establishments	242	280	—13.6
Total cars built:			
Number	138,178	101,243	36.5
Value	$165,071,427	$102,147,396	61.6
Steam—			
Number	135,357	98,471	37.5
Value	$155,029,539	$94,884,287	63.4
Passenger—			
Number	3,558	1,819	95.6
Value	$45,027,083	$15,120,961	197.8
Freight and other—			
Number	131,799	96,652	36.4
Value	$110,002,456	$79,763,326	37.9
Electric—			
Number	2,821	2,772	1.8
Value	$10,041,888	$7,263,109	38.3

*A minus sign (—) denotes decrease.

President as Mediator in Wage Controversy

Calls National Conference Committee and Brotherhood Representatives to Washington to Avert Strike

PRESIDENT Wilson on Monday assumed personal charge of the efforts to bring about a peaceful settlement of the wage controversy between the railways and the four brotherhoods of train service employees, who have demanded an eight-hour basic day and time and one-half for overtime.

After the brotherhoods had announced the results of their vote to strike unless a settlement satisfactory to their leaders was effected the United States Board of Mediation and Conciliation spent five days in an unsuccessful attempt to effect an adjustment or an agreement to submit the points in controversy to arbitration. On Sunday the President sent a letter addressed to the National Conference Committee of the Railways and to the executive officers of the four brotherhoods asking them to confer with him at Washington on Monday.

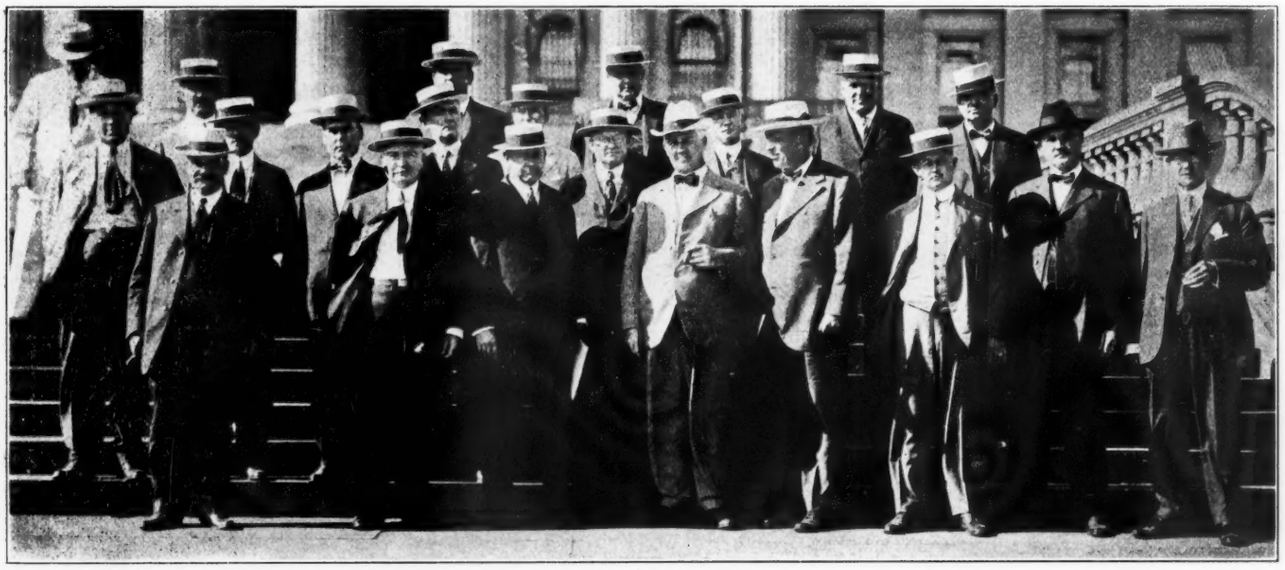
After receiving a report from Commissioner W. L. Chambers of the United States Board of Mediation and Conciliation the President announced that he had cancelled other engagements and would devote his efforts to effecting a settlement which would avert a disastrous strike. He then began a series of conferences with the National Conference Committee of the Railways and the executive officers and a subcommittee of 30 general chairmen of the brotherhoods.

While the exact nature of the discussion betwen the President and the two committees was not disclosed it is understood that the President was emphatic in his insistence that there should be no strike and that he exerted great pressure on both sides to make concessions, on the brotherhood committee to agree to waive their persistent refusal to submit to arbitration and on the managers' committee to concede the principle of the eight-hour day. He is also understood to have proposed various possible bases of compromise.

The officers and committeemen of the brotherhoods held the first meeting with the President on Monday morning. A. B. Garretson, president of the Order of Railway Conductors, acted as spokesman, and gave an explanation of the employees' demands, making a strong plea for a reduction of the hours of employment in freight and yard service. In the afternoon the members of the National Conference Committee met the President and Elisha Lee, chairman of the committee, explained the position of the railroads, showing that the committee had offered to refer the entire controversy to the Interstate Commerce Commission or to arbitration under the Newlands law. After the two conferences it was announced that additional meetings would be held on the following day. The president gave out a statement saying: "I have met both sides and have gone over the case with the utmost frankness. I shall not be able to judge until tomorrow whether we have found a feasible basis for settlement."

On Tuesday President Wilson again conferred with the managers' committee in the morning and with the brotherhood representatives in the afternoon, later giving out statements saying that "a very candid and honest discussion was in progress about a practicable basis of settlement" but that there was no change in the situation. After the meeting with the brotherhood committee it was decided to send to New York for the full brotherhood committee of general chairmen, in order that the discussion might not be confined to the sub-committee of 30. The full committee left New York on Wednesday to meet the President on Thursday.

The President is said to have expressed very strongly his sympathy with the idea of an eight-hour day and to have indicated that he would give support to any plan calculated to bring about its adoption in railroad service if a practical



Group of Railway Managers

This group constitutes the delegation of railroad officers, representing 225 railway systems comprising 1,700 railroads, which conferred with President Wilson at three o'clock Monday afternoon on the pending railway strike. From left to right they are: J. G. Walber, Secretary of the Eastern Conference of Managers; W. L. Seddon, Vice-President, S. A. L.; H. W. McMaster, General Manager, Wheeling & Lake Erie (top row); P. E. Crowley, Assistant Vice-President, N. Y. C. (middle row); S. E. Cotter, General Manager, Wabash; N. D. Maher, Vice-President, N. & W.; P. R. Albright, General Manager, Atlantic Coast Line (middle row); L. W. Baldwin, General Manager, Central of Georgia (top row); Elisha Lee, Assistant General Manager, Pennsylvania (bottom row); A. M. Schoyer, Resident Vice-President, Pennsylvania Lines West of Pittsburgh (face partly hidden by hat); E. W. Grice, Assistant to President, C. & O.; A. S. Greig, Assistant to Receiver, St. Louis & San Francisco (top row); C. L. Bardo, General Manager, N. Y., N. H. & H. (in light suit); A. J. Stone, Vice-President, Erie; E. H. Coapman, Vice-President, Southern Railway; James Russell, General Manager, Denver & Rio Grande; C. H. Ewing, General Manager, Philadelphia & Reading; G. H. Emerson, General Manager, Great Northern; G. S. Waid, Vice-President and General Manager, Sunset Central Lines and C. W. Kouns, General Manager, Atchison, Topeka & Santa Fe.

means could be found, leaving the question of a higher rate for overtime to be settled by arbitration. The National Conference Committee explained the physical operating conditions in railroad service, such as the varying speed of trains, number of stops and length of runs, which stand in the way of a fixed period of service. They also showed the President that the demands of the brotherhoods do not provide for either a maximum or a minimum period of service of eight hours but merely provide for a change in the basis of pay from one-tenth of a day's pay or 10 miles per hour to one-eighth of a day's pay or 12½ miles per hour, with a rate 50 per cent higher than the regular rate for overtime.

Mediation Proceedings in New York

As reported in last week's issue the members of the United States Board of Mediation and Conciliation, W. L. Chambers, Martin A. Knapp and G. W. W. Hanger, came to New York on August 9 and at the request of the National Conference Committee of the Railways began conferences with the committees representing the two parties to the controversy in the effort to bring about an adjustment. The board met with the brotherhood officers and committee at Webster Hall on Wednesday, with the National Conference Committee at the Biltmore hotel on Thursday, and with both committees again on Saturday. On Saturday evening it was announced that efforts to reach a basis for a settlement had failed and that the board was concentrating its efforts toward an agreement to submit the controversy to arbitration. On Sunday, August 13, the board met with the brotherhood committee in the morning and with the railroad conference committee in the afternoon, after which it was announced that the efforts of the mediators had been unsuccessful. The announcement was made by the board in the following statement:

"After repeated efforts to bring about an arbitration of the pending controversy betwen the railroads and their employees in train and yard service, the United States Board of Mediation and Conciliation was today advised by the representatives of the employees that they would not submit the matters in dispute to arbitration in any form.

"The employees further stated to the board that they would not arbitrate their own demands, even if the contingent demands of the railroads were withdrawn, and also declined to suggest any other plan or method for a peaceful settlement.

"They were informed that their decision would at once be made known to President Wilson and also that the President claimed the right to a personal interview with both parties before any drastic action was taken.

"This request was of course granted and a large delegation of employees, with a number of railroad managers, will be in Washington Monday for a conference with the President.

"Early in the negotiations the railroads had informed the Board of Mediation and Conciliation that they would accept arbitration."

A. B. Garretson, president of the Order of Railway Conductors, explained the attitude of the organizations in a statement as follows:

"The Board of Mediation and Conciliation came to us this morning with the statement that all they could offer was precisely what the managers offered us the day we broke with them. That was a proposition that was made across the conference table to us by the conference committee of railroad managers on June 15.

"In other words, after invoking federal mediation the conference committee had not in any way consented to be mediated, but expected all the mediating to be done by the side that had not invoked such offices.

"In answer to the proposition to arbitrate all pending differences, including the managers' tentative proposals, we replied: 'As our proposition for the eight hour day and the punitive overtime has been in the hands of the managers for many months and no proposition has come from them direct or indirect toward settlement, we have nothing to add to our demands as contained in Form 35.'

"We refused to arbitrate on any such basis and shall consider ourselves at liberty to take the necessary steps toward effecting a settlement of the pending controversy in accordance with the methods of these organizations—by withdrawing our men from the services of the roads.

"The mediators, then announcing they officially represented the President of the United States, requested in his behalf a conference with both parties before the final break should take place. They were notified later the four executives of the organizations accompanied by a representative committee would be in Washington tomorrow morning, subject to the request of the President for a conference."

Brotherhood Representatives Who Conferred with President

This group comprises the delegation of brotherhood leaders who conferred with President Wilson Monday evening. They are, from left to right: C. M. Rodgers; Mr. Lewis; W. G. Lee, President of the Brotherhood of Railway Trainmen; S. Veach; A. B. Garretson, President of the Order of Railway Conductors; W. J. Burke; W. S. Stone, Grand Chief of the Brotherhood of Locomotive Engineers; W. S. Carter, President of the Brotherhood of Locomotive Firemen and Enginemen; William Parks; Mr. Rickert; Henry Huddleston; W. O. Van Pelt; O. P. Kelly; F. D. Howard; Peter Kilduff and F. S. Evans.

The letter from President Wilson asking the parties to confer with him was brought to New York during the evening by his secretary, Joseph P. Tumulty, who had left Washington just before the break in the mediation conferences. The letter was addressed to Elisha Lee, chairman of the railway committee, and to the presidents of the four brotherhoods. The President said:

"I have learned with surprise and with keen disappointment that an agreement concerning the settlement of the matters in controversy between the railroads and their employees has proved impossible. A general strike on the railroads would at any time have a most far reaching and injurious effect upon the country. At this time the effect might be disastrous. I feel that I have the right, therefore, to request, and I do hereby request, as the head of the Government, that before any final decision is arrived at I may have a personal conference with you here. I shall hold myself ready to meet you at any time you may be able to reach Washington."

The members of the conference committee and the officers of the brotherhoods, together with a sub-committee of 30 of the general chairmen that had taken part in the conferences, left New York at midnight Sunday for Washington.

R. T. Frazier, Jr., of the Nashville, Chattanooga & St. Louis, who as announced in last week's issue has been securing signatures to a petition urging a settlement on behalf of the unorganized railway employees who would be thrown out of employment by a strike, called at the White House and presented his petition signed by 16,000 men. Mr. Frazier made an unsuccessful effort to see the President before his meeting with the committees.

While the conferences with the President were in progress the following telegram was addressed to Secretary Tumulty, Elisha Lee and the heads of the four brotherhoods by E. L. Howe, executive secretary of the National Retail Dry Goods Association:

"This association, representing large and small retail dry goods merchants throughout the country who have several million employees, and hundreds of millions capital investment, who would be seriously harmed by threatened railway strike, urges you to use every human endeavor to prevent such a calamity. The responsibility for the harm to life and property that would surely follow is too great for any human being to assume. Regardless of the justice of the contention on either side, the country must not from either health or business standpoint be subjected to the terrible harm, not to mention inconvenience, that would result from such a strike. The business of the country will strongly uphold the hands of the President in any move he may take to avert this threatened calamity."

A letter from President Wilson to the president of the Boston Chamber of Commerce, indicating that he is not in favor of an investigation of the wage controversy by the Interstate Commerce Commission, was given out on Monday. The President said:

"Allow me to acknowledge the receipt of your telegram of August 9, conveying to me the vote of the Boston Chamber of Commerce recommending that the Interstate Commerce Commission be instructed by Congress to ascertain the facts in the pending railroad controversy.

"You need not doubt that the full importance and gravity of the now acute controversy between the railroads and their employees has been a constant subject of thought and conference with me, or that I have been trying to make sure that no means of assisting a settlement was overlooked.

"There is no compulsion of law available by which we could oblige either party to the controversy to await the finding of an inquiry by the Interstate Commerce Commission, and it seems to me that such an inquiry is not a remedy at the moment."

Orders which had been issued for the movement of 25,000 additional members of the National Guard from Kentucky, Ohio and Vermont to the Mexican border were suspended by the War Department on Tuesday following the receipt of the following message from General Funston:

"In view of the possibility of a general railroad strike, I desire to call the attention of the War Department to difficulties that will follow in maintaining food supply not only of troops in this department, but of the civilian population as well. These border states produce but little foodstuffs except cattle. In view of foregoing, I recommend that National Guard organizations which are about to start for border stations be retained in their mobilization camps until such time as the question of a general strike shall have been determined."

Several roads have announced that they would be able to obtain enough men to operate trains in the event of a strike. President Ripley, of the Atchison, Topeka & Santa Fe, was quoted as saying that his road would attempt to operate as many trains as possible. The Erie on August 9 published a large advertisement in the newspapers addressed to its train employees. After calling attention to the offer to arbitrate, the statement said: "The long period of friendly relations between the company, its officers and the men on this property is apparently about to be broken by your act in leaving the service. The management deeply regrets these conditions, and has earnestly endeavored to show you the desirability of continuing the friendly and cordial relations which we have mutually enjoyed so many years."

It was then stated that employees who remain in service in the event of a strike will be placed at the head of the respective service rosters in order of their present relative position, and will hereafter be considered the senior employees of the company; that employees who join the strike thereby give up all rights and privileges as employees, and may re-enter the service only at the option of the division superintendents as new employees.

NATIONAL INDUSTRIAL TRAFFIC LEAGUE

The summer meeting of the National Industrial Traffic League was held at Detroit, Mich., on August 10 and 11. Among the important topics discussed were the Newlands resolution, authorizing the investigation of the whole subject of railroad regulation, the subject of railway leases and side-track agreements, uniform baggage rules, the Alexander bill to create a United States Shipping Board, and various proposed changes in demurrage and storage rules.

In discussing the Newlands resolution, H. G. Wilson, chairman of the legislative committee, urged that the League bring strong pressure to bear on the Congressional committee, provided by this resolution, to oppose the elimination of section 4 from the Act to regulate commerce and the amending of section 15 to provide for the payment of the increased rates named in suspended tariffs, the money accruing from the increase to be held by some competent official and paid to the carrier of the tariffs were permitted or refunded if they were condemned. In accordance with the recommendation of the committee, the League ordered that the membership be circularized to sound its sentiment on the following questions:

1. Shall the League favor exclusive federal control of railroads?

2. Shall the League favor exclusive federal incorporation and the regulation of the issuing of securities?

3. If there is to be exclusive federal control, what shall be done about taxation—shall the states continue to levy taxes, or shall it be done by the United States and the amount be apportioned to the states?

4. If there is to be exclusive federal control, shall it include the policing of the operation of trains, etc.?

The committee on railway leases and side-track agree-

ments reported that shippers had been generally signing away their common law rights in side-track agreements and leases of railway property, absolving the railways of all liability in case of loss or damage to the property. On the basis of the recommendations of the committee the League has arranged to be properly represented at the hearing before the Interstate Commerce Commission on "The Matter of Leases and Grants of Property by Carriers to Shippers," which will occur in the fall.

The League approved the recommendation of the legislative committee that the Alexander bill be amended to exclude the regulation of internal and coastwise water-carriers by the proposed United States shipping board, believing that the law, if enacted, would soon force such water lines out of business.

The report of the baggage committee was adopted, the sentiment of the League being strongly in favor of publishing one joint baggage tariff for each passenger association territory.

The recommendation of the committee on car demurrage and storage, that storage rules be not applied on tank cars of crude petroleum oil during the process of loading on carriers' tracks between October 1 and March 31, inclusive, north of the 35th parallel, was approved. It is believed that it is impracticable to load tank cars with crude petroleum oil during cold weather within the free time now allowed. The change in Demurrage Rule 3 and Storage Rule 4, recommended by the American Railway Association, which provides that Sundays and holidays no longer be excluded in computing free time, did not meet with the favor of the League. The recommendation of the committee that the demurrage rules be amended to provide additional time within which to furnish billing instructions on shipments of grain was approved. In accordance with the advice of the committee the League will recommend that the American Railway Association urge upon the various railroads the advantages of publishing and filing in tariff form the Uniform Code of Demurrage Rules and Interpretations with the Interstate Commerce Commission, and also that demurrage rules give cross reference to various interpretations.

In adopting the report of the express committee, the League went on record as not believing the question of carload shipments by express of great importance, and not desiring to interfere with the carriers in classification matters.

With reference to pooling of equipment, the League decided to reserve judgment until the present car service rules, in force since June 1, have been thoroughly tried out.

The League urged the adoption by all carriers of the National Code of Weighing Rules, agreed upon by the League and the American Railway Association.

The recommendation of the general classification committee that the sliding scale of minimum weights now in force in the territory of the Western Classification be adopted by the Official and Southern Classification committees was approved.

Consideration of the reports of the Southern Classification committee on C.L. ratings and mixtures, the unification of rules fixing minima for cars of different lengths, applicable to light and bulky freight, and the minimum charge assessable on long articles, such as iron bars, etc., was postponed until the annual meeting in November.

Considerable discussion was given to the increase in demurrage rates proposed by the American Railway Association as follows: First two days, free time; next three days, $1 per car per day; three succeeding days, $3 per car; each day thereafter, $5 per car. The League membership, after considerable discussion, voted to decline the basis offered by the American Railway Association, and in lieu thereof offered the following counter proposition: First two days, free time; next three days, $1 per car per day; sixth day, $2 per car; seventh day, $3; eighth day, $4; ninth day, $5, and $5 per car per day thereafter. Under the average agreement one credit will be allowed on each car released within the first twenty-four hours, all debits accruing up to 14 days to be offset by credits which may accrue regardless of the demurrage charge, all debits which accrue after the 14-day period not to be offset, it being understood that the carriers would put into effect the following three propositions: First, the increase in per diem rates to $1 per car per day; second, waiving of the home-loading rule during period of car shortage; third, pooling of ordinary box car equipment. It was also suggested that the carriers keep accurate record of the demurrage figures during the period when the higher rates are in effect, in order that it may be demonstrated whether the higher charge accomplishes that for which it was intended; also that the demurrage rules be impartially administered by the carriers; furthermore, that in the event that a joint congestion conference is again in session in New York city or elsewhere the shippers have representation thereon, it being understood that the above higher rates will be effective from October 1, 1916, to April 1, 1917, after which date the present demurrage basis will be automatically restored.

BRITISH RAILWAY WAGES IN 1913

Seven dollars per week was the average wage of all British railway employees during the year 1913. This average, arrived at by the Bureau of Railway News & Statistics and based on the official returns of the British Board of Trade, represents approximately $364 per year against $826 on United States railways in 1915.

"For the first time in history," says the Bureau, "an adequate statement of British employees and labor is rendered possible by the report for 1913, this being the first purporting to cover an entire year. Heretofore, returns were given for only one selected week in each of the four quarters of the year, while every three years a complete census of numbers employed was made.

"British railways employed an average of 615,985 persons during the year for which the average weekly compensation was $4,313,929, or per employee $7.01 weekly and $364 yearly. 'Salaried staff,' the higher classes of employees in each department averaged $10.07 per week, or $524 per year; 'wages staff' received only $6.53 per week, or $340 per year. Weekly wages of salaried and wages staffs and both combined in each department are as follows:

Department	Salaried	Wages	All
Maintenance of way	$14,68	$6.15	$6.51
Maintenance of locomotives	12.21	7.00	7.22
Maintenance of cars	11.40	6.69	6.86
Locomotive operation	10.81	7.85	7.91
Traffic superintendence	12.48	8.15	12.10
Station masters and clerks	8.28	6.58	8.11
Signalmen and gatemen	.....	6.46	6.46
Ticket collectors, policemen, porters, etc	10.98	5.67	5.68
Guards	8.00	7.71	7.71
Collection and delivery freight	10.22	5.70	5.83
General (secretary, general manager, accountant and clerks)	14.33	4.62	13.18
Total	$10.07	$6.53	$7.01

"None of these is exactly comparable with any division on American railways, owing to inclusion of several classes under each heading. The $7.91 per week ($412 per year) for all in locomotive service may be roughly compared with averages of $878 per year for the lowest class of firemen and $2,041 for the highest class of engineers for the United States in 1915. Guards, with $7.71 per week ($401 per year) compare roughly with $825 for the lowest class of trainmen and $1,766 for the highest class of conductors for the United States.

"With 40 per cent as many employees British railways paid only 17 per cent as much in wages. Since the war British employees have received a war bonus which increases their earnings about $62 yearly."

AN IMPROVED TURNTABLE

The Atchison, Topeka & Santa Fe has recently installed new turntables at Wellington, Kan., Amarillo, Tex., and Albuquerque, N. M., in the design of which particular attention was given to the elimination of the customary "pounding" as engines come on and leave the table. Records completed on the Santa Fe show that the cost of maintenance of the center and of the end trucks on other tables on this road amounts to $500 annually, practically all of which is a result of "pounding." The results secured up to the present time from these new tables, which have been in service since last November, appear to justify the conclusion that this hammering is practically eliminated.

This design of table is 97 ft. 6 in. long, out to out of girders, and the inside diameter of the circle wall is 100 ft. These tables replace old ones which were 85 ft. long. They

Side Elevation of the Table

were required primarily to handle the Prairie Mallet locomotives which are operated extensively on the low grade line between Wellington, Kan., and Belen, N. M. These engines are 89.2 ft. long between the centers of end wheels. The tables are of the through type and weigh approximately 90 tons each. With the cast steel filler pedestal blocks supporting the 46 radial tracks at Albuquerque, the table at that point weighs 109 tons complete.

In the design of these tables particular attention was devoted to the connection between the radial tracks and the track on the table. The radial tracks extend to a point 7 in.

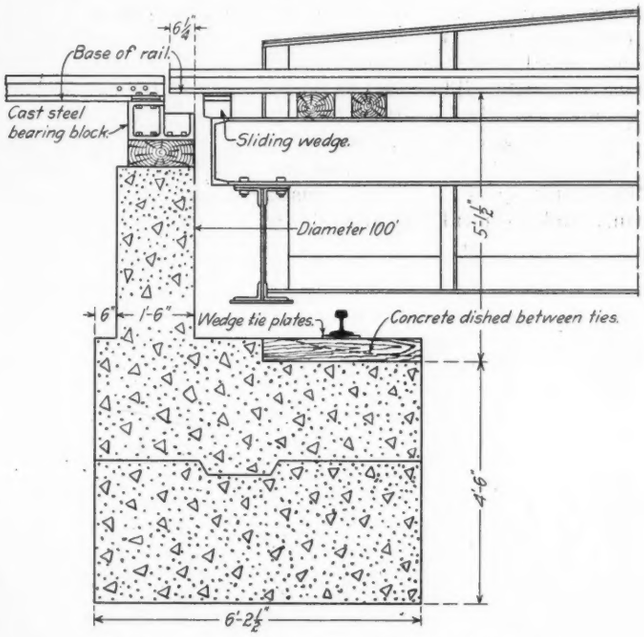
Looking Across the Deck

back of the face of the circle wall and are supported on cast steel bearing blocks which rest on the concrete circle wall. The table rails project 6¼ in. over the circle wall and are supported by wedges which slide in and out on the bottom flanges of the rails and rest on the bearing blocks supporting the radial track rails.

At a point 5 ft. 1½ in. below the base of rail the circle wall is stepped out 4 ft. 2½ in. and provides a support for the pit circle track. This track consists of sized creosoted ties 3 ft. long supporting the circle rail. On each tie is a pair of wedge tie plates, each of which varies from a minimum of ¼ in. to a maximum of 1 in. in thickness. Slots are provided in these plates through which the screw spikes pass which fasten the rail to the ties. If the circle rail pounds down at any point in service it only requires a few minutes to adjust the wedges and bring it back to the proper elevation. By these measures any causes for "pounding" in passing from the radial track to the table are eliminated.

Also, although at first a special tilting arrangement was provided to bring either end of the table down to a bearing to enable engines to pass on to the table, the necessity for this has been removed by counterweighting the motor to keep it on the rail when the table is empty and requiring all loads to come on to the table at this end. The special tilting arrangement was only installed on the first table and its use has been discontinued here.

The center used is the Santa Fe standard conical roller center designed for 500 tons turning load, with steel cones moving between two special nickel steel discs. This is similar to the American Bridge Company's type "D" center. With the tender loaded, the distance from the center of the forward wheel to the center of gravity of the Prairie Mallet locomotive is 46 ft., and with the tender empty, 39 ft. At Albuquerque a small shifting engine is employed to haul



Section of Circle Wall and End of Table

locomotives about the yard. This engine and a large Pacific type passenger locomotive are commonly turned on the table at one time. While the Mallet locomotive can be centered approximately on the table if desired, the two engines cannot, but this lack of balance has not been found to interfere with the operation of the table in any way.

The center is carried on a concrete pedestal supported on creosoted timber or Bois d'Arc piles. The pit is provided with a 4-in. concrete floor. At a distance of 31 ft. 3½ in. from the center of the table, two concrete jacking blocks spaced 17 ft. apart are provided on each side corresponding with shelf angles on the girders above. This permits the table to be raised clear off its bearings twice each year for inspection, in accordance with the standard practice on the system. The top of the center is lifted with the table, permitting the interior of the center to be examined also.

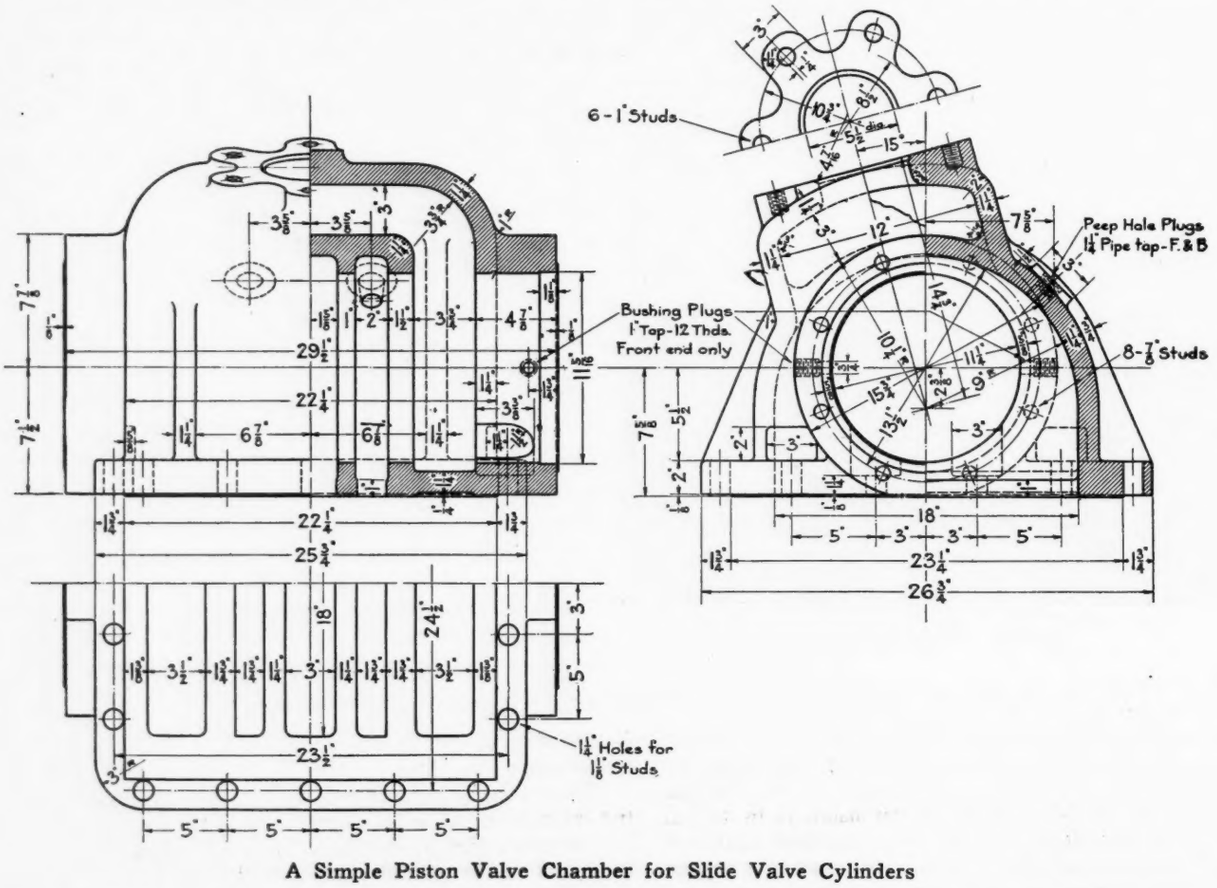
These tables have given excellent satisfaction up to the present time. They are easily operated. On a recent inspection 51 engines were handled on one of the tables in three hours without its being necessary for the operator to reset the table once. These tables were built by the American Bridge Company under the direction of A. F. Robinson, bridge engineer, Santa Fe System.

PISTON VALVE CHAMBER FOR SLIDE VALVE CYLINDERS

The drawing shows a type of piston valve chamber for application to slide valve cylinders which has recently been placed on the market by the G. F. Cotter Supply Company, Houston, Texas. The valve chamber is of a straightforward design, being cast in one piece and fitted to the cylinders in place of the slide valve chest. It is fitted with a bushing having 5/8-in. walls.

The steam chest shown is designed for use with outside steam pipes, this type generally being desirable when the locomotive is equipped with a superheater. The smokebox ends of the steam passages is the cylinder saddles are blanked, the valve ends being blanked by the steam chest, and steam is admitted directly through the top of the steam chest. The steam chest is also built for use with the existing steam pipe arrangement in general use on the older locomotives equipped with slide valves.

The joint between the chest and seat is said to be easily kept tight, sufficient stock being provided in the central bridge in the chest and bushing to admit the use of a stud if desired. Each port is surrounded by a copper wire gasket and special steel holding-down studs are provided for additional security. The effective port opening in the case of the 11-in. valve which is used on engines having cylinders up to 22 in. in diameter is 26 in. in length. Peep-holes are provided to facilitate the inspection and the setting of the valves. The valve spool is a single casting made up of two end rings and a central hub around which is the exhaust cavity.



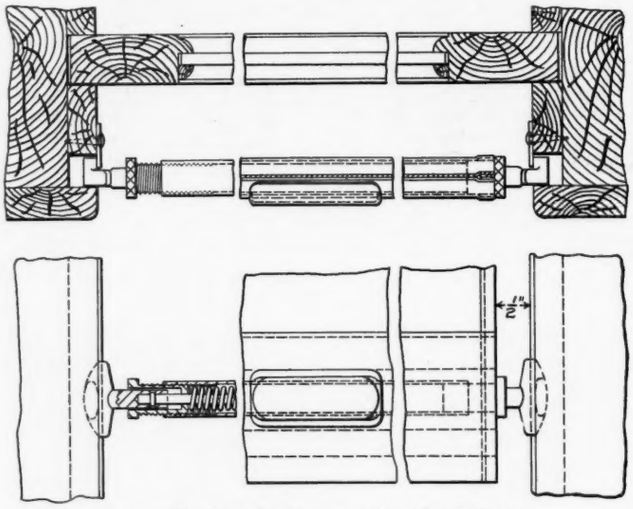
A Simple Piston Valve Chamber for Slide Valve Cylinders

Each of the end rings is fitted with two packing rings of L section.

This steam chest has been in use for several years with both saturated and superheated steam, and it is said to be giving satisfactory service.

ACME ENCLOSED GROOVE CURTAIN FIXTURES

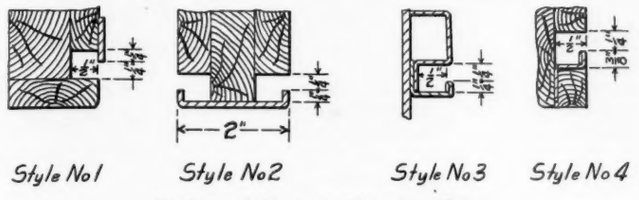
The Acme Supply Company, Chicago, Ill., has recently placed on the market a new curtain fixture, the interesting feature of which is the arrangement preventing the curtain



Acme Enclosed Groove Curtain Fixture

from being accidentally removed from its groove. This is accomplished by placing a retaining strip over the groove, as shown in the illustrations. Metal shoes on the fixture at the bottom of the curtain are provided with flanges, which are held in contact with the retaining strip by springs located inside the fixture tube. No pinch handles are required to operate the curtain, and it can be raised or lowered from any point along the bottom. It automatically retains its

alinement in the horizontal position and the fixture stays inside the groove where it belongs. The springs in the fixture tube cause the flange on the metal shoe to clutch the retaining strip firmly enough to prevent the creeping of the curtain under any service conditions. The groove recommended for the use with this fixture is shown in Style 1. It is ½-in. wide by ½-in. deep, with an opening 5/16-in.



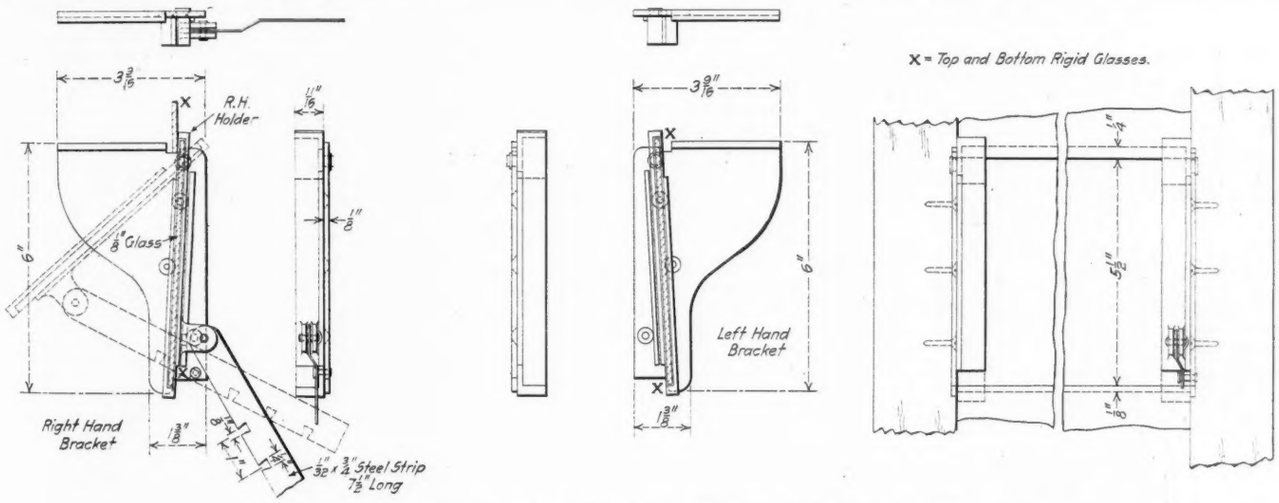
Styles of Groove Construction

wide. Special fixtures, however, can be furnished which will operate in grooves ⅜-in. by ⅜-in., but the ½-in. width is preferable. There are four styles of grooves illustrated to accommodate the various types of car construction. The fixture can be adjusted for proper tension without removing the curtain from the groove.

CLEAR VISION CAB WINDOW

A clear vision cab window which meets the requirements of the new Federal government ruling has been designed and a patent applied for by F. Hopper, master mechanic of the Duluth, Winnipeg & Pacific, Duluth, Minn. The drawing shows the details of the window's construction and its application to front cab windows.

It is necessary in applying this window to cut a hole in the cab window in the direct line of the engineman's vision. This hole is made the full width of the window and 5½ in. deep. The brackets, which are applied to the side frames of the window, contain a piece of glass 5⅞ in. deep and of a width to suit the width of the cab window and the space taken by the brackets. The glass in the clear vision window overlaps that of the cab window at the top on the inside ¼ in. and at the bottom on the outside ⅛ in. An operating handle is provided to move the window into whatever position is desired and when it is closed direct air currents, rain and snow are excluded because of the overlap at the top and bottom. It is advisable to place tape on the ends of the glass before placing it in the holders. There are no cross pieces of wood or metal in the cab window to obstruct the view of the engineman; even with the clear vision window applied the complete area of the window glass remains. The window is inexpensive to make; there are only four small metal parts which may be made of brass, pressed steel or malleable iron. It is easily applied and the cost of application is small. Windows of this type are in service on the Duluth, Winnipeg & Pacific and the enginemen express themselves as greatly pleased with them.



Details and Application of Clear Vision Window to Front Cab Windows

TEAM-WORK ON THE SOUTHERN

Fairfax Harrison, president of the Southern Railway, in executive order No. 76, issued August 11, congratulates the officers and employees of the company on recent events as follows:

"In the emergency created by the recent floods our organization has had a new test and has given a new proof of its efficiency. Men of all departments and of all branches of the service have demonstrated again the reason why the management has confidence and pride in them. In saving life and property while the danger was imminent, in promoting the comfort of marooned passengers, in restoring structures and reconstructing track so as to make possible, in the shortest possible period of time, a resumption of service vitally necessary to many isolated communities, and not forgetting the less conspicuous but equally necessary work of assembling and forwarding material, the Southern organization has deserved and won much praise from the public. Those of us who know in detail what the character of the work has been and the difficulties which have been surmounted by sheer courage and trained skill can best appreciate how well that praise has been merited.

"Where all have done their duty it would be invidious to single out for special mention even those whose service has been most notable because their opportunity was greatest. I must, then, content myself with thanking you as an organization, but I intend the thanks for each of you who is conscious of deserving them.

"In saying this I have a deep sense of pride in my own membership in that organization, for I do honor to myself in honoring you.

"The company has suffered a hard blow in property loss, but, as none of us is to blame, there is no use in repining. Let us rather gird up our loins for a new effort to make up the losses in the coming year; to repeat the kind of service which has made so great a success of our work during the past two years. Finally, while congratulating ourselves on what has been accomplished, let us not forget that we all owe and cheerfully give a tribute of our highest respect to those brave men who lost their lives in the line of duty at the Belmont bridge."

General News Department

Representative Taggart of Kansas has introduced in Congress a bill to amend the employers' liability act. He proposes to take away from employers the defense of contributory negligence in every case where the road has violated any *state* or federal law; to abolish entirely the doctrine of assumption of risk, and to add a new section providing that where suit is brought for the death or injury of an employee on a railroad there shall be a prima facie presumption that he was engaged in interstate commerce. The House committee reported this bill to the House of Representatives August 4.

The Boston & Albany has ordered the necessary material to at once comply with the recommendations of the recent grade crossing conference in relation to signs at highway crossings. Disks will be used by the attendants in the daytime in place of flags, and for night signals lights will be provided which will show red to the highway and white to the enginemen of trains. Gates will be painted with "barber-pole" stripes, black and white. The company will furnish free, to cities and towns, the 24-in. disks needed for the fixed caution signal, and is asking the municipalities to co-operate with the road in these measures to promote safety.

In the United States district court at Belmar, N. J., August 10, a preliminary injunction was issued restraining the commissioners of Jersey City from enforcing their embargo on shipments of munitions, in pursuance of which the city police officers stopped numerous freight trains entering Jersey City for the purpose of forbidding the entrance of explosives. The action of the court was taken on petition of the Canadian Car & Foundry Company, complaining that its shipments of munitions for Europe over the Delaware, Lackawanna & Western, were being illegally delayed. The Central of New Jersey on August 15 secured from the same court a general order restraining the officers of the city from interfering with the movement of explosives; and other roads will take similar action.

Standard Coupler Adopted

The result of the special letter ballot for the adoption of the Type *D* Standard Coupler of the M. C. B. Association gives the adoption of this coupler a majority of 83 per cent, there being 2,037 votes cast in favor of this coupler and 416 against, making a total of 2,453 votes cast, with 1,635 necessary for adoption.

Trolley-Car Disaster Near Johnstown, Pa.

In a collision of electric cars of the Southern Cambria Traction Company, on August 12 at Echo, Cambria county, Pa., seven miles from Johnstown, 25 persons were killed and many others were injured. The accounts indicate that a car which became uncontrollable on a steep descending grade crashed at full speed into a car standing on the main track at the foot of the grade.

The Local Freight Conductor's Duty

At least 75 per cent of the OS&D errors referred to me are cases where a proper check of freight has not been made of l. c. l. freight unloaded from cars in transit in local freight trains.

The chief weakness in the matter seems to rest in the lack of co-operation that the freight crews give the station force. The freight crews seem to be engrossed with the "get over the road" idea. No manner of persuasion from a station force can get the idea into a train crew that they should unload the freight slowly so it can be checked properly, and that it is wrong to open up two to five cars at once and unload freight while there is only one station man on hand to check the freight. A large percentage of the fellows in the freight claim department are entirely unfamiliar with this feature and therefore do not understand why it is that a station agent should make such a contention when these OS&D matters are referred to him.

I have worked for 22 railroads and have worked as despatcher and chief despatcher on eight of them, and I have found but few cases where, sooner or later, a local crew did not begin to get away from the idea that their train was being run primarily for the distribution of l. c. l. freight. There is no reason why a local, handling l. c. l. and general way station work, should endeavor to make red ball freight train time for no other purpose than to "get over the road."

A local freight train should be operated with the chief aim to handle the l. c. l. business and station work thoroughly and practically. This should be kept constantly in mind by the conductor rather than the necessity for "getting over the road." The local freight train conductor should specialize on how to serve and improve upon serving the purpose for which his train is operated. The chief elements in this specific purpose are the matter of station switching and the handling of l. c. l. freight. He should instruct his crew to see that each waybill is properly checked and that all notations are placed thereon in a complete manner.—*R. L. Carter, in M. K. & T. Magazine.*

Master Blacksmiths' Association

The twenty-third annual convention of the International Railroad Master Blacksmiths' Association was held at Hotel Sherman, Chicago, August 15 to 17, T. E. Williams of the Wabash railroad presiding. The meeting was opened with prayer by Reverend De Lacey, and the convention welcomed to the city by a representative of the Mayor. The following companies were represented by exhibits at the convention:

Acme Machinery Co., Cleveland, Ohio.—Machine forgings manufactured with Acme machines. Represented by Charles W. Durschlag and Frank Andrews.

Ajax Manufacturing Co., Cleveland, Ohio.—Machine forgings which are products of the Ajax forging machines. Represented by J. R. Blakeslee, Henry Gaul, A. L. Guilford and J. A. Murray.

Goldschmidt Thermit Co., New York City.—Thermit and Thermit welding appliances, together with specimens of welds free from carbon and ferro alloys. Represented by William Aldrich, H. D. Kelley, Anton Lucas, H. S. Mann and J. G. McCarty.

E. F. Houghton & Co., Philadelphia, Pa.—Case hardening compounds, quenching, tempering and cutting oils and air brake and hydraulic packing. Represented by E. J. Graham and E. Nilssen.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Annual convention, October 19-21, New Orleans, La.

AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Annual meeting, October 17, 18, Washington, D. C.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Annual meeting, August 16-18, 1916, Memphis, Tenn.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 8 W. 40th St., New York. Annual convention, October 9-13, Atlantic City, N. J.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOCIATION.—H. G. McConnaughy, 165 Broadway, New York. Annual convention, October 9-13, Atlantic City, N. J.

AMERICAN RAILWAY ASSOCIATION.—J. E. Fairbanks, general secretary, 75 Church St., New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 17-19, New Orleans, La.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, August 24-26, 1916, Hotel Sherman, Chicago.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meteings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual convention, October 10, 1916, Waldorf-Astoria, New York.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—P. C. Jacobs, H. W. Johns-Manville Co., Chicago. Meetings with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JUNE, 1916

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.	Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Atlanta, Birmingham & Atlantic	640	$175,114	$42,844	$237,615	$30,190	$48,052	$14,951	$90,360	$25	$9,198	$192,777	$44,838	$13,100	$31,738	.....
Bingham & Garfield	36	246,653	2,640	250,948	23,548	24,323	1,007	27,073	74	4,741	80,765	170,182	5,949	164,233	59,341
Buffalo & Susquehanna R. R. Corp.	253	129,257	5,138	137,087	41,578	25,321	1,606	37,207	.....	5,134	110,847	26,240	2,600	23,640	16,069
Chicago Great Western	1,496	835,958	309,704	1,261,660	165,533	108,067	48,625	386,003	7,694	33,785	748,770	512,890	49,341	462,650	129,837
Denver & Rio Grande	2,577	1,538,239	364,995	2,061,735	240,506	366,805	40,513	480,467	30,957	55,126	1,214,375	847,360	94,461	752,791	105,539
Denver & Salt Lake	255	132,553	34,508	172,729	16,899	41,468	3,890	50,372	.....	9,482	122,112	50,618	8,017	42,601	34,193
Detroit, Toledo & Ironton	441	165,965	13,141	193,006	16,072	25,290	4,165	87,112	.....	6,313	138,952	54,053	9,467	44,586	6,050
Georgia	307	146,420	60,715	213,966	10,740	36,997	14,372	109,253	89	8,430	178,272	35,695	4,874	30,516	5,199
Great Northern	8,101	5,162,057	1,307,828	7,133,075	1,512,763	634,968	117,827	1,822,635	82,581	131,729	4,220,808	2,912,270	508,111	2,403,438	716,928
Gulf & Ship Island	308	117,765	23,366	150,686	11,098	26,365	4,206	80,353	316	7,729	130,067	20,619	7,556	12,594	—34,694
Kansas City, Mexico & Orient	738	156,258	28,461	195,653	46,311	44,193	9,667	92,538	.....	10,248	202,957	—7,305	11,000	—18,305	—8,270
Minneapolis, St. Paul & Sault Ste. Marie	4,228	2,137,023	577,582	2,928,243	314,101	347,176	57,239	807,660	13,321	63,486	1,600,411	1,327,832	130,447	1,197,385	593,497
New Orleans, Texas & Mexico	192	70,554	17,660	93,329	14,571	27,062	6,537	40,948	.....	128,922	218,039	—124,710	1,637	—126,366	—75,535
Northern Pacific	6,505	4,626,017	1,418,953	6,664,577	996,493	1,058,155	116,474	1,750,417	90,940	99,979	4,071,905	2,592,672	538,731	2,052,578	—89,897
Oregon Short Line	2,259	1,531,127	443,507	2,207,632	285,409	220,935	36,572	455,712	33,120	55,394	1,087,141	1,120,490	135,230	984,468	436,183
Pittsburgh, Shawmut & Northern	294	186,659	9,775	199,111	48,394	59,613	1,520	63,453	.....	5,294	178,273	20,838	1,902	18,935	—31,028
St. Louis & San Francisco	4,752	2,684,231	1,072,111	3,997,016	538,669	794,064	76,100	1,217,155	.....	99,795	2,677,164	1,319,853	173,657	1,145,020	589,387
St. Louis, San Francisco & Texas	235	48,139	24,027	73,831	17,695	20,113	2,483	43,275	.....	4,278	87,844	—14,013	1,565	—15,616	5,428
St. Louis Southwestern of Texas	810	220,399	67,125	320,052	47,436	101,735	17,232	137,532	1,761	19,624	318,928	1,125	16,783	—15,685	—32,442
Spokane, Portland & Seattle	555	259,993	150,684	460,267	76,912	44,174	10,838	106,953	4,754	15,150	258,388	201,879	57,445	144,357	94,531
Ulster & Delaware	129	38,402	32,611	89,504	9,765	13,578	3,306	36,030	53	6,150	68,883	20,621	10,208	10,409	14,298
Union Pacific	3,622	3,787,214	1,017,218	5,528,087	886,864	485,872	114,769	1,200,488	90,848	123,148	2,871,794	2,656,293	209,700	2,443,054	685,557
Virginia & Southwestern	225	145,714	15,932	167,614	30,568	94,438	2,383	50,723	.....	7,316	185,427	17,813	7,517	25,401	—59,127
Wheeling & Lake Erie	512	814,445	53,459	958,234	126,958	111,406	10,286	292,126	1,427	15,744	557,946	400,288	44,366	355,884	182,779

TWELVE MONTHS OF FISCAL YEAR 1916

Alabama & Vicksburg	143	$1,125,637	$412,276	$1,684,825	$205,433	$357,941	$44,745	$574,697	$25,159	$66,032	$1,273,203	$411,622	$112,371	$298,072	$215,918
Alabama Great Southern	309	4,100,575	1,136,300	5,641,402	498,852	1,341,320	160,321	1,621,706	36,212	107,001	3,761,383	1,880,019	198,420	1,681,301	737,038
Arizona Eastern	378	2,679,386	438,526	3,310,302	597,832	332,325	28,182	682,364	15,870	131,297	1,784,772	1,525,530	220,020	1,304,170	632,800
Atchison, Topeka & Santa Fe	8,648	75,617,801	27,541,698	112,625,273	15,455,619	17,336,929	2,322,006	30,350,471	.....	2,269,408	67,553,414	45,071,859	5,327,652	39,711,168	8,781,068
Atlanta & West Point	93	722,770	460,617	1,367,285	161,210	256,268	73,102	426,441	24,251	54,505	994,834	372,451	77,639	288,270	112,816
Atlanta, Birmingham & Atlantic	640	1,131,996	232,673	1,478,665	236,653	285,306	84,202	564,165	154	53,539	1,224,018	254,647	78,600	176,047	.....
Atlantic Coast Line	4,706	23,292,589	8,271,629	34,445,110	4,311,802	5,580,775	703,179	11,216,199	125,147	884,196	22,797,008	11,648,102	1,793,831	9,838,827	2,809,713
Baltimore & Ohio Chicago Terminal	79	.....	6,786	1,796,502	199,073	237,436	11,221	824,668	18,962	101,931	1,360,216	436,287	227,967	206,476	—41,033
Baltimore, Chesapeake & Atlantic	88	686,921	387,810	1,127,927	91,630	304,300	17,146	604,151	.....	37,809	1,055,014	72,912	26,886	45,991	—68,696
Bangor & Aroostook	632	2,921,639	644,215	3,775,766	559,130	590,398	35,594	1,024,662	38,536	137,717	2,385,304	1,390,462	156,005	1,233,755	—37,663
Belt Ry. Co. of Chicago	31	.....	.....	2,911,555	208,620	371,468	12,949	1,250,486	.....	72,761	1,916,284	995,271	153,736	841,535	—481,958
Bessemer & Lake Erie	205	10,431,729	372,756	11,014,151	979,531	2,057,297	116,676	2,526,640	.....	177,703	5,712,600	5,301,551	232,670	5,068,853	1,378,083
Bingham & Garfield	36	2,107,082	38,010	2,159,059	207,024	205,011	12,499	275,222	1,103	31,424	732,283	1,426,776	59,932	1,366,845	617,114
Buffalo & Susquehanna R. R. Corp	253	1,574,919	79,280	1,681,463	266,177	424,172	13,828	461,303	.....	65,215	1,230,696	450,767	31,200	419,564	253,356
Buffalo, Rochester & Pittsburgh	586	10,381,647	1,144,892	11,971,019	1,652,890	2,753,623	142,840	3,819,911	15,282	264,244	8,648,790	3,322,229	250,000	3,072,101	758,014
Canadian Pacific Lines in Maine	234	1,626,924	208,919	1,957,063	229,277	235,610	63,273	782,114	.....	45,255	1,355,528	601,534	96,309	505,225	436,454
Carolina, Clinchfield & Ohio	283	2,651,271	218,593	2,932,851	290,412	389,002	140,866	528,495	.....	123,789	1,460,414	1,472,437	147,181	1,325,125	473,189
Carolina, Clinchfield & Ohio of S. C	18	148,382	15,595	168,593	15,474	1,068	23,735	30,477	.....	10,070	80,394	88,199	8,100	80,039	28,099
Central New England	301	4,219,857	431,341	4,870,933	495,384	428,961	14,227	1,642,818	.....	57,002	2,637,506	2,233,427	168,442	2,064,784	721,668
Central of Georgia	1,924	8,258,346	3,039,905	12,567,618	1,742,269	2,161,729	431,291	4,041,649	17,718	463,186	8,845,067	3,722,551	639,520	3,067,289	519,656
Charleston & Western Carolina	341	1,451,402	334,040	1,885,624	286,017	243,024	39,949	609,091	.....	56,563	1,234,266	651,358	75,122	575,873	236,123
Chesapeake & Ohio Lines	2,386	39,079,087	5,998,044	48,239,012	5,553,447	10,561,094	648,188	13,809,686	288,847	953,685	31,789,179	16,449,833	1,587,407	14,842,218	4,292,304
Chicago & Alton	1,052	11,126,697	3,929,506	16,325,288	1,849,002	3,421,351	430,104	5,480,917	117,612	369,629	11,601,794	4,723,494	566,839	4,147,140	1,486,556
Chicago & Eastern Illinois	1,136	12,471,388	2,907,481	16,698,404	2,284,191	3,849,471	302,563	5,721,359	95,282	455,673	12,680,319	4,018,085	703,457	3,309,647	1,315,418
Chicago & Erie	270	6,623,708	587,583	7,820,770	708,056	783,122	213,687	2,907,626	26,126	175,171	4,803,042	3,017,728	264,827	2,752,866	1,398,249
Chicago & North Western	8,108	60,353,399	21,445,004	91,313,866	11,608,646	14,598,777	1,307,139	32,119,223	664,390	1,874,091	61,952,329	29,361,537	4,741,527	24,606,707	4,722,802
Chicago Great Western	1,496	10,492,684	3,280,656	15,067,345	1,983,135	2,436,353	546,487	5,257,979	101,749	406,925	10,716,498	4,350,847	553,129	3,787,048	897,117
Chicago Junction	13	.....	.....	2,329,410	249,878	219,420	13,525	1,276,218	.....	65,181	1,824,222	505,188	38,649	466,527	166,717
Chicago, Milwaukee & St. Paul	10,210	76,036,097	18,923,893	105,646,484	11,563,769	16,518,476	1,899,027	37,728,571	738,379	1,920,467	69,120,958	36,525,526	5,264,331	31,222,860	6,537,747
Chicago, Peoria & St. Louis	255	1,368,590	287,142	1,752,800	236,325	348,812	68,305	711,444	.....	64,894	1,429,779	323,021	63,015	260,006	140,274
Chicago, Rock Island & Gulf	477	2,285,781	615,285	3,151,053	495,053	421,643	115,614	1,076,698	18,313	99,288	2,226,249	924,805	116,703	807,294	216,056
Chicago, St. Paul, Minn. & Omaha	1,753	12,860,214	5,191,441	19,522,563	2,340,883	2,419,137	350,316	7,208,271	185,008	472,922	12,958,838	6,563,725	1,022,053	5,535,335	821,448
Cincinnati, Hamilton & Dayton	622	8,131,885	1,330,171	10,561,749	1,769,145	2,118,617	194,518	3,742,576	39,598	271,655	8,113,865	2,447,884	378,857	2,066,038	1,344,328
Cincinnati, Indianapolis & Western	322	893,940	286,289	1,296,706	166,124	168,727	38,891	565,504	2,726	48,655	988,383	308,323	66,591	241,732	.....
Cincinnati, New Orleans & Tex. Pacific	337	8,620,611	1,779,080	11,060,440	1,092,408	2,705,302	302,480	3,165,059	71,731	255,573	7,592,379	3,468,061	380,147	3,087,016	845,327
Cincinnati Northern	246	1,538,404	206,389	1,816,370	300,424	301,984	35,174	579,377	.....	36,113	1,253,072	563,298	68,371	494,853	178,259
Cleveland, Cincinnati, Chic. & St. Louis	2,384	30,572,917	9,120,149	43,478,002	4,489,879	8,181,629	934,307	14,513,103	284,157	877,290	29,195,230	14,282,772	1,556,131	12,717,953	5,475,761
Colorado Midland	338	1,211,655	179,452	1,516,758	258,651	365,233	88,515	650,821	12,765	65,164	1,441,149	75,610	96,862	21,252	—78,485
Cumberland Valley	164	2,654,252	656,869	3,478,178	367,432	315,172	50,716	1,021,222	11,391	107,772	1,865,892	1,612,286	71,030	1,541,218	721,053
Delaware & Hudson Co.—R. R. Dept	886	21,620,334	2,860,323	25,922,671	2,113,551	4,216,582	326,886	8,670,845	209,830	852,757	16,370,167	9,552,504	658,458	8,891,854	1,552,350
Delaware, Lackawanna & Western	955	36,034,113	8,462,493	49,335,739	4,572,871	7,180,602	894,349	15,557,129	370,713	982,935	29,511,905	19,823,834	2,210,734	17,609,604	4,083,452
Denver & Rio Grande	2,577	18,314,342	4,764,729	24,890,084	2,536,790	4,189,319	487,024	6,500,570	419,987	605,733	14,739,410	10,150,674	1,091,461	9,057,705	2,546,098
Denver & Salt Lake	255	1,485,507	325,116	1,893,747	223,655	391,965	25,761	665,893	.....	60,517	1,367,681	526,067	90,503	435,399	18,625
Detroit & Mackinac	393	786,082	310,506	1,175,727	132,937	207,414	25,043	398,010	988	33,192	797,584	378,142	99,506	275,336	74,245
Detroit & Toledo Shore Line	81	1,693,407	.....	1,706,518	134,349	96,970	18,525	444,124	.....	33,737	727,705	978,812	80,280	897,339	236,421
Detroit, Toledo & Ironton	441	1,902,238	161,654	2,212,266	229,427	288,619	49,356	968,802	.....	74,891	1,611,094	601,172	72,967	528,170	409,553
Duluth & Iron Range	277	6,062,342	247,338	6,493,283	743,740	873,513	16,433	1,539,040	17,359	127,197	3,308,341	3,184,941	353,699	2,830,152	1,015,813

REVENUES AND EXPENSES OF RAILWAYS

TWELVE MONTHS OF FISCAL YEAR 1916—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures.	Equipment.	Traffic.	Transportation.	Miscellaneous.	General.	Total.	Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Duluth, Missabe & Northern	411	$10,640,876	$338,597	$11,470,003	$1,311,087	$1,345,887	$29,778	$1,921,554	$60,139	$155,639	$4,824,084	$6,645,919	$629,565	$6,016,354	$3,041,424
Duluth, South Shore & Atlantic	628	2,316,448	890,511	3,506,792	582,103	430,019	89,012	1,223,400	43,984	113,631	2,482,149	1,024,644	251,683	772,711	433,369
Duluth, Winnipeg & Pacific	187	1,415,904	225,122	1,692,720	158,792	179,717	26,854	617,700	7,957	73,261	1,058,281	634,440	84,711	549,728	299,500
El Paso & Southwestern Co	1,027	8,438,925	1,643,229	10,671,627	1,314,373	1,337,981	221,241	2,631,995	76,084	342,732	5,924,268	4,747,359	471,367	4,275,680	1,632,288
Elgin, Joliet & Eastern	800	12,511,829	111	13,353,457	1,050,552	2,544,942	80,798	3,683,693	.....	262,089	7,620,248	5,733,209	458,783	5,273,556	2,460,500
Erie	1,988	49,863,156	9,171,190	65,115,459	5,144,907	11,563,393	1,095,233	23,132,457	412,513	1,363,869	42,638,484	22,476,975	2,104,882	20,333,154	8,526,115
Florida East Coast	745	4,255,965	2,032,689	7,204,482	805,011	795,253	112,075	2,034,715	42,316	234,676	3,995,586	3,208,897	326,855	2,881,418	1,023,419
Galveston, Harrisburg & San Antonio	1,351	8,985,996	3,052,189	12,831,389	1,951,668	1,776,595	364,702	4,752,244	126,262	385,800	9,315,071	3,516,318	596,447	2,912,587	1,458,680
Galveston Wharf	14	.....	.....	1,373,245	41,039	27,611	4,492	374,208	412,884	4,611	864,844	508,401	131,199	377,161	—347,082
Georgia	307	2,095,295	771,068	3,097,865	272,377	483,953	152,954	1,242,351	1,087	93,077	2,242,930	854,935	134,562	719,083	316,001
Georgia, Southern & Florida	395	1,471,091	654,867	2,445,408	270,527	467,120	86,264	895,502	3,966	110,672	1,833,853	611,556	137,075	471,055	217,649
Grand Rapids & Indiana	575	3,613,839	1,572,032	5,632,005	647,804	955,728	131,607	2,220,098	16,134	178,531	4,149,903	1,482,102	272,638	1,207,572	239,129
Great Northern	8,101	60,177,249	13,661,645	81,233,092	9,696,663	8,737,483	1,168,733	22,292,307	875,730	1,355,155	43,862,972	37,370,120	5,130,379	32,234,834	6,531,594
Gulf & Ship Island	308	1,479,916	344,208	1,964,177	171,989	309,775	37,633	528,356	3,511	90,174	1,141,437	822,740	83,737	738,167	308,583
Gulf, Colorado & Santa Fe	1,938	11,448,109	3,015,263	15,425,934	3,033,511	2,350,124	362,055	6,492,462	.....	491,853	12,672,696	2,753,238	724,838	2,021,730	—2,162,791
Houston, East & West Texas	191	1,050,981	340,281	1,486,214	261,972	206,214	24,991	489,454	8,291	38,475	1,027,525	458,688	54,675	403,123	153,326
Houston & Texas Central	895	4,548,162	1,424,266	6,484,167	1,021,981	907,799	193,638	2,258,536	65,749	225,083	4,665,365	1,818,802	361,905	1,454,398	401,125
Illinois Central	4,767	50,045,039	13,582,092	69,077,343	9,506,527	16,547,749	1,252,366	21,841,050	375,222	1,763,356	51,173,728	17,903,615	3,724,021	14,155,087	3,276,614
Indiana Harbor Belt	110	.....	.....	4,136,471	469,396	456,222	34,260	1,628,730	.....	96,742	2,685,351	1,451,120	91,248	1,358,584	438,152
International & Great Northern	1,159	6,869,511	1,822,362	9,420,291	1,450,127	1,623,969	254,063	3,792,984	47,342	346,919	7,339,224	2,081,067	418,677	1,660,408	853,908
Kanawha & Michigan	177	3,173,632	372,036	3,636,400	473,840	775,305	36,311	914,353	193	82,413	2,282,414	1,353,986	161,860	1,191,758	482,231
Kansas City, Mexico & Orient	738	2,075,502	385,960	2,599,332	625,761	537,624	106,614	1,090,325	.....	123,972	2,484,297	115,036	141,208	—26,196	—224,530
Kansas City Southern	837	8,094,107	1,513,168	10,583,630	1,132,086	1,277,531	334,668	3,298,504	.....	410,184	6,361,722	4,221,909	561,990	3,655,260	677,986
Lake Erie & Western	900	5,858,815	741,358	6,941,354	791,825	1,219,981	155,516	2,289,841	.....	150,623	4,607,786	2,333,568	283,803	2,048,803	1,056,596
Lehigh & Hudson River	97	1,798,159	84,618	2,109,857	205,440	269,259	17,815	681,828	.....	52,288	1,226,629	883,228	58,010	825,218	253,663
Lehigh & New England	296	3,080,845	14,908	3,278,968	436,557	386,352	24,201	839,651	.....	71,872	1,758,037	1,520,931	88,360	1,432,377	333,640
Lehigh Valley	1,444	40,027,913	4,300,183	47,382,569	4,657,854	9,364,629	996,249	16,966,439	153,599	984,132	33,092,978	14,289,592	1,706,093	12,574,714	1,702,911
Long Island	397	4,173,239	8,159,048	14,208,120	1,615,026	1,543,366	135,219	5,712,866	74,538	392,434	9,463,675	4,744,445	900,208	3,838,450	462,169
Louisiana & Arkansas	279	1,416,959	186,350	1,652,092	294,361	258,088	39,995	425,907	.....	50,762	1,069,112	582,980	92,562	489,915	6,341
Louisiana Ry. & Navigation Co	351	1,705,989	333,608	2,180,030	317,634	327,992	75,456	727,761	.....	63,942	1,512,785	667,245	113,955	553,133	176,819
Louisiana Western	208	1,634,922	641,618	2,441,952	324,223	386,330	85,273	638,538	21,987	73,210	1,529,422	912,530	121,022	790,805	266,563
Louisville, Henderson & St. Louis	200	1,114,524	411,653	1,617,244	357,891	191,711	60,489	483,040	.....	38,380	1,131,512	485,732	45,877	439,308	168,847
Maine Central	1,220	7,758,889	3,371,976	12,001,673	1,644,715	1,691,646	137,860	4,328,942	43,035	347,911	8,192,578	3,809,095	636,423	3,171,505	610,023
Michigan Central	1,803	26,846,145	10,129,996	41,884,593	4,906,157	6,239,845	758,723	14,519,445	626,806	794,960	27,845,935	14,038,658	1,633,936	12,398,101	5,047,825
Midland Valley	385	1,343,069	425,170	1,862,608	334,566	300,461	29,215	577,805	.....	75,198	1,316,159	546,448	77,866	467,935	226,505
Minneapolis & St. Louis	1,646	8,166,056	1,951,088	10,721,513	1,116,265	1,525,268	212,151	3,896,217	931	271,265	7,022,098	3,699,414	458,679	3,237,062	460,758
Minneapolis, St. Paul & Sault Ste. Marie	4,228	26,181,226	6,357,573	35,010,064	3,230,947	4,193,675	632,827	10,168,375	184,561	704,801	19,081,068	15,928,996	1,537,712	14,391,284	5,574,872
Missouri & North Arkansas	365	758,183	352,166	1,195,832	320,960	242,892	36,150	432,793	.....	66,338	1,099,132	96,700	71,972	24,019	245,639
Missouri, Kansas & Texas System	3,865	21,697,723	8,321,250	32,485,508	6,734,992	5,864,189	692,662	11,223,773	200,868	1,122,023	25,794,345	6,691,163	1,650,167	5,029,973	—3,554,632
Missouri, Oklahoma & Gulf Ry. of Texas	125	210,063	5,091	217,663	39,763	30,753	21,669	113,753	.....	16,894	222,832	—5,170	2,765	—7,935	9,581
Mobile & Ohio	1,122	9,998,658	1,218,798	11,868,038	1,185,363	2,486,541	429,098	4,094,740	28,246	373,441	8,533,737	3,334,301	406,384	2,925,200	264,438
Monongahela	108	1,801,465	75,254	1,906,247	261,776	163,547	10,675	405,506	.....	42,948	884,452	1,021,795	58,855	962,940	.....
Morgan's La. & Texas R. R. & S. S. Co.	405	3,170,470	1,001,059	4,546,868	695,228	758,193	141,789	1,590,472	27,035	139,421	3,350,772	1,196,096	270,697	923,264	214,406
Nashville, Chattanooga & St. Louis	1,231	8,989,417	2,670,319	12,670,688	1,481,600	2,329,256	613,330	4,463,966	122,753	438,069	9,439,033	3,231,655	325,251	2,903,144	1,386,530
Nevada Northern	165	1,697,976	136,039	1,885,753	218,950	165,556	7,469	343,956	884	55,101	791,916	1,093,837	80,586	1,013,232	561,157
New Orleans & North Eastern	204	2,807,263	593,420	3,781,662	406,689	644,471	126,135	1,141,549	70,572	139,824	2,527,344	1,254,318	188,399	1,064,440	398,290
New Orleans, Mobile & Chicago	402	1,656,759	288,439	2,039,134	311,200	323,036	51,393	629,280	62	82,698	1,397,668	641,466	80,472	559,916	185,787
New Orleans, Texas & Mexico	192	1,274,625	273,301	1,637,820	315,044	273,729	52,099	569,765	.....	234,779	1,445,416	192,404	18,231	173,591	63,540
New York Central Railroad	6,093	131,823,248	48,548,075	209,303,754	20,537,477	36,264,195	2,913,548	65,918,375	2,803,828	4,511,748	132,949,171	76,354,583	8,823,200	67,509,927	.....
New York, Chicago & St. Louis	570	12,497,580	1,331,107	14,378,614	1,093,772	2,398,806	537,599	5,564,638	47,722	261,562	9,904,100	4,474,514	501,376	3,967,070	2,071,081
New York, New Haven & Hartford	2,005	37,448,021	29,620,567	76,311,653	8,779,166	10,859,656	470,278	28,423,557	845,780	1,756,431	51,078,358	25,233,295	2,856,255	22,371,280	3,870,392
New York, Ontario & Western	568	6,011,150	1,618,562	8,942,252	1,055,019	1,391,248	93,120	3,462,601	.....	203,449	6,202,922	2,739,330	259,923	2,477,863	336,423
New York, Philadelphia & Norfolk	112	3,993,599	441,045	4,764,736	404,306	918,733	57,921	1,722,714	48,593	133,549	3,282,701	1,482,035	124,967	1,355,752	673,726
New York, Susquehanna & Western	140	2,509,831	628,812	3,537,346	270,835	384,570	23,444	1,666,013	.....	70,170	2,413,001	1,124,345	161,857	961,864	22,920
Norfolk & Western	2,086	49,559,140	5,796,583	57,304,586	6,571,329	10,046,263	703,055	14,135,112	106,483	891,631	32,181,346	25,123,240	2,065,000	23,054,786	9,779,324
Norfolk Southern	908	3,246,086	1,061,954	4,591,924	553,298	661,882	90,041	1,550,396	1,244	211,288	3,068,148	1,523,776	148,391	1,371,975	602,303
Northern Pacific	6,505	55,656,395	13,852,254	75,939,231	8,833,210	7,846,259	1,177,971	20,900,055	986,735	1,134,020	40,366,412	35,572,819	5,073,415	30,493,190	8,904,696
Northwestern Pacific	507	1,752,406	2,078,202	4,319,598	660,183	501,547	68,947	1,441,561	4,241	96,414	2,752,955	1,566,643	204,818	1,361,361	582,479
Oregon Short Line	2,259	18,376,526	4,731,988	24,982,959	2,945,924	2,869,527	417,795	5,552,982	360,143	667,981	12,810,584	12,172,374	1,615,864	10,551,561	3,751,389
Oregon-Washington R. R. & Nav. Co	2,053	11,528,584	4,419,729	17,447,346	2,900,606	1,993,901	532,703	5,513,121	215,674	750,725	11,846,448	5,600,898	1,192,503	4,406,384	71,222
Fanhandle & Santa Fe	670	4,182,259	968,381	5,394,313	967,803	804,430	50,034	1,298,745	.....	129,137	3,245,109	2,149,204	141,663	2,006,253	1,117,130
Pennsylvania Company	1,758	53,586,339	11,086,953	71,255,665	9,055,642	11,758,928	960,297	22,696,913	399,674	1,587,203	46,447,373	24,808,292	3,403,105	21,402,493	10,892,352
Pennsylvania Railroad	4,541	158,597,513	42,035,662	220,113,358	27,159,754	42,259,305	2,371,229	75,441,498	2,870,414	5,176,779	155,278,979	64,834,379	7,839,321	56,949,999	20,577,121
Pere Marquette	2,249	15,098,256	4,129,018	21,210,053	2,007,172	4,268,058	381,311	7,338,105	48,323	492,361	14,530,425	6,679,629	626,275	6,045,026	1,974,394
Philadelphia, Baltimore & Washington	717	12,231,167	9,209,652	23,680,869	3,120,217	4,202,129	324,152	8,936,810	1,248	607,656	17,192,213	6,488,657	668,780	5,816,899	2,655,707
Pittsburgh & Lake Erie	225	19,508,994	1,789,561	22,635,156	1,772,059	3,174,086	163,718	4,859,454	41,913	360,583	10,371,814	12,263,342	649,122	11,614,177	6,811,270
Pittsburgh, Cincinnati, Chic. & St. Louis	1,489	33,217,119	8,856,110	47,370,153	6,627,203	9,005,131	792,352	15,955,313	316,572	1,134,790	33,827,895	13,542,258	2,038,313	11,501,395	4,167,132
Pittsburgh, Shawmut & Northern	294	2,259,199	113,874	2,405,641	384,488	607,023	18,870	737,862	.....	58,366	1,806,606	599,034	23,735	575,299	209,929
Rutland	468	2,188,951	1,204,751	3,875,098	451,212	637,381	112,156	1,349,956	12,491	74,897	2,638,094	1,237,004	204,897	1,032,091	304,345
St. Joseph & Grand Island	258	1,417,780	310,936	1,840,900	371,023	271,168	53,617	602,425	2,111	65,998	1,366,342	474,558	97,443	376,637	137,845
St. Louis & San Francisco	4,752	32,287,854	11,122,728	46,358,626	6,900,946	7,742,853	800,382	14,553,898	.....	1,185,625	30,811,370	15,547,256	2,093,945	13,434,112	2,358,491
St. Louis, Brownsville & Mexico	548	1,650,829	753,249	2,606,446	453,827	356,479	72,516	883,347	.....	145,883	1,873,267	733,179	105,171	624,264	98,996
St. Louis Merchants' Bridge Terminal	9	.....	3,524	2,245,527	318,654	111,361	9,563	1,007,031	.....	79,281	1,525,891	719,636	103,598	616,011	203,504
St. Louis, San Francisco & Texas	235	719,283	277,768	1,095,698	250,434	193,770	25,595	505,591	.....	53,482	1,028,874	66,825	20,848	45,415	44,137

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

CINCINNATI RAILWAY CLUB.—H. Boutet, Chief Interchange Inspector, Cin'ti Rys., 101 Carew Bldg., Cincinnati. Regular meetings, 2d Tuesday, February, May, September and November, Hotel Sinton, Cincinnati.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month. Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Next meeting, August 15-17, 1916, Hotel Sherman, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Annual meeting, August 29 to September 1, Hotel Sherman, Chicago.

MAINTENANCE OF WAY AND MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—F. W. Hager, Fort Worth & Denver City, Fort Worth, Tex. Next convention, October 17-19, Philadelphia, Pa.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next annual meeting, September 12-14, 1916, "The Breakers," Atlantic City, N. J.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meeting, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meeting, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Annual meeting, October 3-5, 1916, New York.

RAILWAY REAL ESTATE ASSOCIATION.—Frank C. Irvine, 1125 Pennsylvania Station, Pittsburgh, Pa. Annual meeting, October 11-13, 1916, Chicago.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Next annual convention, September 12-14, 1916, Grand Hotel, Mackinac Island, Mich.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—P. J. McAndrews, C. & N. W., Sterling, Ill. Next annual convention, September 19-22, 1916, New York.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—L. W. Cox, 1217 Commercial Trust Bldg., Philadelphia, Pa. Annual meeting, October 18-20, Washington, D. C.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. R. R., Atlanta, Ga. Next meeting, October 19, 1916, Birmingham, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grand Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEWARK.—Roy S. Bushy, Firemen's Bldg., Newark, N. J. Regular meetings, 1st Monday in month, except July and August, The Washington, 559 Broad St., Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agent, Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.

TRAFFIC CLUB OF ST. LOUIS.—W. S. Crilly, 620 South 7th St., St. Louis, Mo. Annual meeting, December 5, 1916, Noonday meetings, October to May.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., Cleveland, Ohio. Next meeting, September 5-8, 1916, Hotel Sherman, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Grand Pacific Hotel, Chicago.

WESTERN SOCIETY OF ENGINEERS.—E. N. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The Southern Pacific has reduced freight rates on various commodities from California to points east of the Mississippi and south of the Ohio river, including canned goods, apples, pears, beans, peas, citrus fruits, dried fruits, melons, hops, brandies, wines, nuts and tomatoes.

The Pennsylvania Railroad, in a circular calling attention to the need of checking infantile paralysis, recommends that certificates be procured from the proper health officers for all children under sixteen years of age before buying tickets to any point. In the region of New York City and Philadelphia, additional quarantines are being constantly established, and in all directions children are likely to have their journeys cut short by the quarantine officers. The Baltimore & Ohio, whose cautionary circular to employees was issued July 10, soon after the epidemic began to spread from New York City to surrounding places, set forth in succinct fashion what is known as to the cause and the prevention of the disease, with advice as to proper hygienic measures.

Panama Canal Traffic

The annual report of the Panama Canal will show a large deficit as compared with the preceding year, owing to the obstruction of the canal by slides from the middle of September to the middle of April. The figures, for the principal items, for the years ending June 30, are as below:

Panama Canal Traffic.

	1916 5 Months	1915 10½ Months
Vessels	787	1,088
Net Tonnage	2,479,761	3,843,035
Cargo	3,140,046	4,969,792
Tolls	$2,399,830	$4,343,384
Op. and Maint. Exp.	6,999,750	
Deficit	4,599,920	
Surplus Over Exp.		$276,656

The cost of the dredging done in the last fiscal year was $3,560,016. This is the largest item under the head of operation and maintenance.

LIGHT RAILWAYS IN WARFARE.—The network of light railways belonging to the Belgian Société des Chemins de Fer Vicinaux has been very extensively used by the German forces, and it appears that when these lines are somewhat too far from the scene of operations the tracks have been taken up and have been employed, together with the rolling stock, where they are required.

NEW GERMAN RAILWAY TAXATION.—An extension and increase of the stamp duty on railway consignment notes and other railway documents is one of the features of the taxation recently approved by the German Federal Council and voted by the Reichstag. It is anticipated that the new duties will bring in a new revenue of 80,000,000 marks ($19,200,000). This is the second recourse that Germany has had to taxation on railway transport since the beginning of the war, the first having been early in 1915, when the cost of certain auxiliary services was increased. The new taxation is confined to freight traffic, because the tax imposed in 1906 on railway tickets led to such a large migration from the higher to the lower classes of carriage as to be practically worthless from a revenue standpoint. Consignment notes for full car-loads first had to pay a stamp duty in 1906. This duty is now increased, and a duty is also to be payable on consignment notes for less than a car-load, which have hitherto escaped taxation. Documents bearing on "traffic de groupage," i. e., where several consignments are grouped together to form one car-load, will have to bear a stamp of 5 pfennings (1 cent) each. Another important innovation is the imposition of a charge of 3 pfennings per metric ton on traffic originating on private industrial railways. In many instances the industrial railways belonging to large concerns are of considerable length, and have direct communication with inland waterways, and without this special charge they would have avoided any contribution to the new taxation.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

In a general circular issued August 10 the commission called attention to the threatened car shortage, now believed to be pending, due in some measure at least to the heavy shipments of grain during this period of the year. The commission urges upon both carriers and shippers the necessity of carefully supervising methods of loading and moving cars, and declares particularly against the use of cars by shippers for storage purposes, requesting that all cars be released as promptly as possible, and that shippers should not avail themselves of the full limit of free time provided by the tariffs. Carriers are advised to exert every effort to eliminate delays and expedite the movement of shipments, returning to the home line as promptly as possible after unloading all cars received from connecting companies.

Indiana and Illinois Coal

Opinion by the commission:

The commission finds that the carriers have justified proposed increased rates on bituminous coal in carloads from mines in Illinois and Indiana to points in Illinois, Indiana, Wisconsin and Michigan. The increases amount to 5 cents a net ton. (40 I. C. C., 603.)

Rates from Shreveport, La., to Points in Texas

Railroad Commission of Louisiana v. Arkansas Harbor Terminal Railway et al. Opinion by Commissioner Hall:

The commission finds that the class rates between Shreveport and points in Texas are unreasonable and that they are prejudicial to that point in so far as they exceed the rates for like distances between points in Texas, except in instances where the latter have been reduced below the regular mileage scale applied in that state on account of water competition along the Gulf of Mexico or waters contiguous thereto. It also makes similar findings concerning the carload commodity rates on beef cattle; stock cattle; horses and mules; stone (rough); sand and gravel; common brick; fire brick; junk; lignite; cordwood and tan bark; machinery (gin and irrigation); glass fruit jars and bottles; iron and steel articles; potatoes and turnips; fruits, melons, and vegetables; empty barrels and kegs; blackstrap molasses; cottonseed and products; unshelled peanuts; flour; wheat; corn; hay; agricultural implements, except hand implements; bagging and ties; binder twine; cans, cases, and pails (tin); baskets; chocolate raw materials; dry goods; window glass; glassware (table); horse and mule shoes; oil (refined petroleum); iron and steel pipe; wrapping paper; printing paper; tin articles; wire and nails; door locks; tools, files and rasps, and other articles taking the same rates.

It is also found that the present differences in classifications is prejudicial to Shreveport. The carriers must apply to the transportation of property between points in Texas the provisions of the western classification.

In Railroad Commission of La. v. St. Louis Southwestern, 23 I. C. C., 31, the commission found that the class rates of the Texas & Pacific, the Houston, East West Texas, and the Houston & Shreveport from Shreveport to certain points in Texas were unreasonable. Its order required the establishment of reasonable rates and the three carriers were required to "abstain from exacting any higher rates for the transpotation of any article" from Shreveport to Dallas, Tex., and points intermediate via the line of the Texas & Pacific, and from Shreveport to Houston, Tex., and points intermediate via the lines of the Houston, East & West Texas and the Houston & Shreveport, than are charged from Dallas or Houston, for an equal distance toward Shreveport. From the latter portion of that order the carriers appealed to the Commerce Court, where the order was upheld in Texas & P. Ry. Co. v. United States, 205 Fed., 380. That court's decision was sustained by the Supreme Court of the United States in Houston & Texas Ry. v. United States, 234 U. S., 342.

Upon petition by complainants for additional relief a supplemental hearing was had and on June 17, 1915, there was a supplemental report and order, Railroad Commission of Louisiana v. St. L. S. W. Ry. Co., 34 I. C. C., 472. This order applied to many carriers not parties to the original proceeding and required, among other things, that all the carriers named therein should establish on or before September 15, 1915, and maintain for single-line application from Shreveport to all points in that part of Texas on and east of a line drawn through Gainesville, Fort Worth, and Waco, Tex., and thence via the Brazos River to the Gulf of Mexico, the territory so described being termed "eastern Texas" in the supplemental report, class rates no higher than a certain mileage scale there found reasonable. These carriers were authorized to construct rates for joint line application by adding certain amounts to the scale prescribed for use over single lines. The order also required the carriers to cease charging rates from Shreveport to destinations in eastern Texas higher than for an equal distance from points in eastern Texas toward Shreveport, or higher, distance considered, than the corresponding class rates named in the order.

Rates were filed as required by this order, but after protest the effective date of the supplemental order was postponed. This matter and other points are here again taken up in a single case.

The commission as a result of its investigations notes as to the condition of the railways in Texas that:

First—The amount paid out by these roads for rental of equipment is an unusually large proportion of their revenues. This is said to be due to lack of funds available for the purchase of equipment.

Second—The personal injury claims paid were relatively large and constitute a material drain. They amounted to $2,905,398 in 1914, 5.813 cents for every revenue train-mile of service performed and 2.47 per cent of the total railway operating revenue. This percentage is much higher than that paid by some of these lines upon the revenues earned in adjoining states, and is far in excess of the proportion paid by other lines operating in contiguous territory.

Third—Loss and damage to freight, damage to property and damage to stock on right of way on the Texas roads amounted to $2,720,226 during the fiscal year 1914, or 2.32 per cent of the total railway operating revenue for the year. The amount so paid by Texas roads greatly exceeds that paid by other lines operating in adjoining states.

Fourth—The taxes paid in 1914 amounted to $5,058,269, or 4.32 per cent of the total railway operating revenues for that year. Taxes for all the years shown from 1908 to 1914 have quite steadily increased. This might be expected, since the values of the properties have been increasing. The total railway operating revenues, however, have not kept pace with the rising tide of taxes. The percentages of those revenues which have been required to pay the taxes were 2.36 per cent in 1900, 2.87 per cent in 1909, and 4.32 per cent in 1914.

Fifth—The exhibits of average loading of cars in Texas as compared with the minima required intrastate in Texas show that many of these commodities can be, and generally are, loaded to and above the minima required by the interstate tariffs.

Sixth—The net corporate income was, for the fiscal year:

1908	loss..	$6,294,769
1909	gain..	3,278,347
1910	gain..	1,594,519
1911	gain..	507,108
1912	loss..	3,282,493
1913	loss..	1,601,378
1914	loss..	8,144,597
1915	loss..	6,619,553

The 1915 report includes only 32 roads and embraces the entire lines of the Texas & Pacific, Gulf, Colorado & Santa Fe, and Missouri, Kansas & Texas of Texas, respectively. The aggregate net corporate loss of these 32 roads during the last eight years is over $20,000,000. This does not take account of the interest on the second mortgage income bonds of the Texas & Pacific, which amounts to more than $1,100,000 annually and has not been paid. If this interest had been paid or became a charge against the property, the deficit shown would have been correspondingly larger.

The arrangements of these Texas lines with affiliated interstate lines for divisions and for the exchange of traffic and equipment are said to be satisfactory to the Texas lines and appear to be fair to them.

From the record before us we are unable to tell in all instances by whom the losses indicated have been borne. Some of the

bonds and certificates of indebtedness are held by other railroad companies operating through other states.

A new mileage scale of class rates is prescribed as follows:

Miles.	1	2	3	4	5	A	B	C	D	E
10 and less	23	19	16	14	10	10	8	7	6	5
20 and over 10	27	22	19	16	12	13	10	9	8	6
30 and over 20	30	25	21	18	14	16	12	10	9	7
40 and over 30	33	28	23	20	16	17	13	11	10	8
50 and over 40	37	31	26	22	18	19	15	13	11	9
60 and over 50	40	34	28	24	20	21	16	14	12	10
70 and over 60	43	37	30	26	21	22	17	15	13	11
80 and over 70	47	40	33	28	23	24	19	16	14	12
90 and over 80	50	43	35	30	25	26	20	18	15	12
100 and over 90	53	45	37	32	27	28	21	19	16	13
110 and over 100	57	48	40	34	29	30	23	20	17	14
120 and over 110	60	51	42	36	30	31	24	21	18	15
130 and over 120	63	54	44	38	31	33	25	22	19	16
140 and over 130	67	57	47	40	33	35	27	23	20	17
150 and over 140	70	60	49	42	35	36	28	25	21	18
175 and over 150	75	64	53	45	38	39	30	26	22	19
200 and over 175	80	68	56	48	40	42	32	28	24	20
225 and over 200	85	72	59	51	43	44	34	30	26	21
250 and over 225	90	77	63	54	45	47	36	32	27	22
300 and over 250	100	85	70	60	50	52	40	35	30	25
350 and over 300	103	87	72	62	52	54	41	36	31	26
400 and over 350	106	90	74	64	53	55	42	37	32	26
Over 400	106	90	74	64	53	55	42	37	32	26

In its original report the commission used the Texas intrastate rates as a guide for the construction of rates between Shreveport and Texas points for distances of 245 miles or less. It seems clear from the present record that the class rates prescribed are too low for hauls of 60 miles or less.

The percentage relation of the various classes in this scale follows closely the relation in Memphis Freight Bureau vs. St. L., I. M. & S. Ry. Co., 39 I. C. C., 224; cities of Marshall and Jefferson, Tex., vs. T. & P. Ry. Co., 39 I. C. C., 249.

It is as follows:

Class	1	2	3	4	5	A	B	C	D	E
Percentage	100	85	70	60	50	52	40	35	30	25

Class rates for joint line application may be made by adding to the rates prescribed in the above table the following amounts, in cents per 100 pounds:

Class	1	2	3	4	5	A	B	C	D	E
Cents	8	7	6	5	4	4	4	3	2	2

Rates so made, however, must not exceed the following in cents per 100 pounds for distances of 400 miles or less:

Class	1	2	3	4	5	A	B	C	D	E
Cents	106	90	74	64	53	55	42	37	32	26

The western boundary of Texas common-point territory on interstate traffic coincides in part with the western boundary of that territory as it applies on intrastate traffic. In all instances in which these two boundaries do not coincide, the boundary of the intrastate territory is farther west than that of the interstate. For example, Laredo and Amarillo are both west of interstate, but within intrastate common-point territory. The territory in Texas lying west of these boundaries is known as differential territory. A table is given of the proper differentials to be applied in this case ranging from 2 cents on first class to one cent on class E for 20 miles or less to 30 cents on first class to 10 cents on class E for over 300 miles.

The commission notes concerning the relation of intrastate and interstate rates that if the sole issue were whether or not the present adjustment of rates was prejudicial to Shreveport, an order might be issued which could be complied with by increasing the Texas rates to the level of the interstate rates, or by reducing the interstate rates to the intrastate basis.

"Should the latter alternative be adopted, either voluntarily or under compulsion of the State authorities, the intrastate rates and regulations would be given extraterritorial force and would become the standard for interstate commerce. The effect of adopting such a plan would not stop with Shreveport. Alexandria and Monroe, La., Vicksburg, Miss., and other points are in competition with Shreveport for trade and commerce to and from Texas and, so far as we are advised, there is no more reason for extending the Texas rates and classification to Shreveport than to other points in Louisiana or other States east of the Mississippi River.

"It can easily be conceived that if carriers in removing prejudice against interstate commerce, were bound to follow the standard set by the State authorities, interstate rates, based in part on the requirements of one State and in part on those of others, would soon be in inextricable and intolerable confusion, productive of discord, and ruinous alike to shippers and carriers. This the commerce clause of the constitution, under which Congress has created this commission and vested it with power, was designed to prevent.

"In this proceeding the allegation of undue prejudice is not the sole issue. Defendants' class rates and many of their commodity rates are attacked as unreasonable.

"It is perhaps unnecessary to say that the findings and conclusions of State commissions respecting the reasonableness of intrastate rates should be given great weight, that rates established in accordance with such findings should not lightly be disturbed and that we consider it our duty to cooperate in every proper way with the State authorities.

"But the obligation placed upon us by the law requires us to exercise our best judgment upon the facts placed before us and, in a case such as this, to prescribe just and reasonable maximum rates and enter such order as shall prevent or remove undue prejudice to interstate commerce, even though in some instances such action may incidentally affect the level of intrastate rates." (41 I. C. C., 83.)

COURT NEWS

Seizure of Shipment Under Legal Process

Action was brought for the alleged conversion by the defendant railroad of goods shipped by the plaintiff over the road from a point in Minnesota to a point in Montana. After the goods arrived at destination they were seized under a writ of replevin issued in an action brought in Montana against the plaintiff. The railroad promptly notified the plaintiff of these proceedings. The Minnesota Supreme Court held that it was a good defense to the action if the railroad proved that the legal process under which the property was seized was regular and valid upon its face. The process was not invalid on the ground that the seizure was an interference with interstate commerce.—Burkee v. Great Northern (Minnesota), 158 N. W., 41.

Initial Carriers' Liability

The Idaho Supreme Court holds that a common carrier which receives goods for interstate shipment is the initial carrier, although it only switches the cars in which they are loaded to the lines of another common carrier to be transported out of the state.

An initial carrier is not liable for damage to goods occurring on lines not its own, and over which they are routed without notice to it. The obligation of such a carrier ceases when the goods reach, in good condition, the destination to which they were originally consigned.—Barrett v. Northern Pac. (Idaho), 157 Pac., 1016.

Right of Track in a Terminal Yard

In an action against a railroad company for the death of a fireman in a rear collision in a terminal yard, it appeared that the company's rules provided that a signal at proceed does not insure an unobstructed track ahead, and enjoined extraordinary care, reminded employees that other trains are acting on the same rules, and that within the interlocking limits trains must expect to find the tracks occupied; and that trains must be kept under full control. The Missouri Supreme Court holds that ordering the train on which the deceased was fireman to proceed past a signal post was not negligence on the part of the company. Nor was it negligence to send out two trains on the same track one minute apart.—Moyes v. St. Louis, I. M. & S. (Mo.), 186 S. W., 1027.

Municipal Consent Not Required to Build Branch Lines

The Lehigh & New England built a single track 100 feet long from a point on its main line in Bethlehem across Conestoga street to the plant of the Lehigh Valley Chemical Company without the borough's consent. In an action by the borough to require the removal of the track, the Pennsylvania Supreme Court held that the line was not a "lateral track," but a "branch line," within the act of 1868 authorizing railroad companies incorporated under that act to construct such branches from their main lines as they may deem necessary. The railroad company, having laid its main line in the borough with the consent of the municipal authorities, the borough could not restrain this construction of a branch line across a street.—Borough of Bethlehem v. Lehigh & N. E. (Pa.), 97 Atl., 1074.

Railway Officers

Executive, Financial, Legal and Accounting

Alexander R. Lawton has been elected president of the Sylvania Central, with headquarters at Savannah vice Mills B. Lane, resigned.

Arthur C. Griffith has been appointed auditor and treasurer of the Pittsburg & Shawmut, and Charles W. Hatch, cashier, both with headquarters at Kittanning, Pa.

R. Home Smith has been elected president of the Mexico-North Western, succeeding Dr. F. S. Pearson, deceased. His offices will be located at Toronto, Ont., and El Paso, Tex.

F. C. King has been appointed real estate and claim agent of the Wabash Pittsburgh Terminal and the West Side Belt, with headquarters at Pittsburgh, Pa., vice P. K. Soffel, resigned.

L. C. McCutcheon, chief clerk in the freight loss and damage claims department of the St. Louis & San Francisco, has been promoted to assistant superintendent of freight loss and damage claims department, with headquarters at Springfield, Mo.

The agreement under which the receiver of the Pittsburg, Shawmut & Northern is operating the Pittsburg & Shawmut will be terminated at midnight August 31, 1916. After that date the Pittsburg & Shawmut, comprising the railroad from Erie Junction, Brockwayville, Pa., to Freeport, Pa., will be operated independently by its own officers, with general offices at Kittanning, Pa.

Albert William Johnston, whose appointment as assistant to the president of the New York, Chicago & St. Louis, has been announced, was born at Boston, Mass., on March 4, 1853. He graduated from the Massachusetts Institute of Technology. He entered railway service in July, 1875, and was consecutively clerk and draftsman in the office of the general superintendent of the Pittsburgh, Cincinnati & St. Louis until December, 1878, when he was made assistant engineer on the same road. From March, 1880, to January 1, 1882, he was superintendent of an industrial corporation in Arizona. He was then chief engineer of the Toledo, Delphos & Burlington until April, 1882, when he was appointed superintendent of the Leavenworth, Topeka & Southwestern. From April, 1884, to January, 1889, he was division engineer of the Eastern division of the New York, Chicago & St. Louis, and from the latter date to October 1, 1893, was superintendent of the same division. He was general superintendent of the Nickel Plate from October 1, 1893, to February 1, 1906, when he was promoted to general manager, the position he held up to the time of his recent appointment as assistant to the president. His headquarters will continue to be at Cleveland, Ohio.

A. W. Johnston

John F. Turner, whose appointment as general auditor of the Boston & Maine, with headquarters at Boston, Mass., has already been announced in these columns, has been in the service of that road or its predecessors since 1885. He was born July 24, 1865, at West Lebanon, N. H., and received his education at Kimball Union Academy, Meriden, N. H. He entered railroad service on June 1, 1885, as yard clerk in the employ of the Passumpsic Railroad, now a part of the Boston & Maine. In July, 1886, he became a division office clerk for the Boston & Lowell at Concord, N. H., and November, 1886, was transferred to a similar position at White River Junction. In February, 1887, he became an audit office clerk for the Boston & Lowell at Boston. He became a clerk in the office of the auditor of freight accounts for the Boston & Maine in April, 1888, and served as chief clerk in that office from June, 1892, to April, 1911, when he became auditor of freight receipts. It is this position he leaves to take up his new duties as general auditor as above noted.

Operating

Enoch W. Underwood has been appointed superintendent of the Buffalo division of the Erie, vice Charles E. Eckels, transferred.

Charles E. Eckels has been appointed superintendent of the Rochester division of the Erie, vice Edmund I. Bowen, transferred.

Edmund I. Bowen has been appointed division superintendent of the Erie, with headquarters at Marion, Ind., vice Theodore Mackrell, deceased.

Fred Hugh Knickerbocker, assistant to the vice-president and general manager of the Oregon Short Line, with headquarters at Salt Lake City, Utah, has been appointed general superintendent, with headquarters at Pocatello, Idaho, in place of W. A. Whitney, transferred. Mr. Knickerbocker was born at Chicago, Ill., on December 10, 1875, and was educated in the public schools of Omaha, Neb. He first entered railway service on March 16, 1897, as a stenographer in the general freight department of the Oregon Short Line at Salt Lake City. From December 31, 1899, to January 1, 1900, he was general freight agent of the same road, following which he was secretary to the general superintendent until May 15, 1902, when he was made secretary to the vice-president and general manager. He was promoted to assistant to the general manager on January 1, 1909, since which time he has been consecutively assistant to the general manager, assistant general manager and assistant to the vice-president and general manager. His appointment as general superintendent at Pocatello, Idaho, was effective on August 15.

F. H. Knickerbocker

E. D. Leavitt has been appointed trainmaster of the western division of the Southern Pacific, with headquarters at West Oakland, Cal., vice G. E. Gaylord, promoted.

The office of superintendent of car service of the Pittsburg, Shawmut & Northern has been abolished and the duties of that office will be assumed by J. D. Beaver, superintendent, St. Mary's, Pa.

James T. Colbert, superintendent of car service of the Pittsburg, Shawmut & Northern has been appointed superintendent of the Pittsburg & Shawmut with headquarters at Kittanning, Pa.

R. D. Williams, general agent of the Erie, with headquarters at Los Angeles, Cal., has been appointed manager Pacific Coast traffic, with headquarters at San Francisco, Cal., to succeed C. W. Colby, deceased.

R. A. Grammes, terminal train master of the Philadelphia division of the Baltimore & Ohio has been appointed assistant superintendent of the Baltimore division in charge of the terminals at Baltimore. He will have offices at Baltimore. He succeeds J. P. Kavanaugh, transferred and assigned to other duties.

W. A. Whitney, general superintendent of the Oregon Short Line at Pocatello, Idaho, has been appointed superintendent of transportation of the Union Pacific, vice W. D. Lincoln. F. H. Knickerbocker, assistant to the vice-president and general manager of the Oregon Short Line, has been appointed general superintendent at Pocatello to succeed W. A. Whitney. G. L. Hickey, trainmaster of the Oregon Short Line, with headquarters at Pocatello, Idaho, has been appointed assistant to the vice-president and general manager, with headquarters at Salt Lake City, Utah, vice Mr. Knickerbocker, promoted. H. W. Doty has been appointed trainmaster, with headquarters at Pocatello, in place of G. L. Hickey, promoted, effective August 15.

Kenneth M. Nicoles, whose appointment as superintendent of transportation and telegraph of the Western Pacific has been noted, was born on July 17, 1859, at Paris, Ill., where he received a common school education. He entered railway service as a telegrapher on the Indianapolis, Peru & Chicago, on December 24, 1879. From 1883 to 1888 he served the Chicago & North Western as telegrapher and train despatcher. He then entered the employ of the Northern Pacific as despatcher, subsequently being promoted to chief despatcher. In 1906 he was appointed trainmaster of the Lake Superior division with headquarters at Duluth, Minn. He was promoted to assistant superintendent of the same division in October, 1909, and to superintendent in November of the same year. In June, 1912, he was transferred to Fargo, N. D., where he remained as division superintendent until February, 1913, when he resigned. He entered the service of the Western Pacific in April, 1913, as trainmaster at Stockton, Cal. He was promoted to superintendent of transportation and telegraph with office at San Francisco, Cal., on August 1.

George D. Hood, whose appointment as superintendent of telegraph of the Chicago, Rock Island & Pacific, with headquarters at Chicago, Ill., has been noted in these columns, was born at Yarmouth, N. S., on November 16, 1875. He was educated in the common schools and at Yarmouth Academy, and first entered railway service as a telegraph operator on the Intercolonial in Nova Scotia. Subsequently he was employed in the same capacity by that road in New Brunswick, and by the Western Union Telegraph Company at Halifax, N. S., in 1892, and at St. Paul, Minn., in 1893. For a short period in 1893 he was a telegraph operator for the Northern Pacific at St. Paul, following which he went to Helena, Mont., where he remained in the service of the same road until 1902, successively as telegraph operator, wire chief and assistant city ticket agent. He then left the Northern Pacific to enter the service of the Atchison, Topeka & Santa Fe at Topeka, Kan. He remained in that city as wire chief, manager of the telegraph and relay office, and chief clerk to the superintendent of telegraph until 1910, when he went to Seattle, Wash., to become superintendent of the Pacific division of the Western Union Telegraph Company. His appointment as superintendent of telegraph of the Rock Island was effective August 1.

G. D. Hood

Traffic

Raymond E. Ball has been appointed general freight and passenger agent of the Pittsburg & Shawmut with headquarters at Kittanning, Pa.

W. T. Kraft, traveling freight agent of the Northern Pacific at Jamestown, N. D., has been promoted to general agent, freight department, at the same city.

John L. Greenwood has been appointed general agent of the Toledo, St. Louis & Western, with headquarters at San Francisco, Cal., succeeding G. L. Townsley, the office of commercial agent having been abolished.

H. O. Mills, commercial agent of the Toledo & Ohio Central and the Zanesville & Western, with headquarters at Columbus, Ohio, has been promoted to division freight agent, with headquarters at Toledo, vice H. G. L. Campbell, resigned to engage in other business. Eugene Dupuis has been appointed commercial agent, with headquarters at Columbus, Ohio, vice Mr. Mills, promoted.

Bode K. Smith, whose appointment as general passenger agent of the Western Pacific has been announced, was born at San Francisco, Cal., on August 2, 1883. He was educated in the public schools of his native city and first entered railway service in a minor capacity on the Rio Grande Western on May 1, 1899. Subsequently, he served the following railroads consecutively at San Francisco: The Denver & Rio Grande as traveling passenger agent, the same railroad as city passenger agent, the Denver & Rio Grande, the Texas & Pacific and International & Great Northern as city passenger agent, and the Missouri Pacific as city passenger agent. From September 1, 1913, to August 1, 1916, he was assistant general passenger agent of the Western Pacific at San Francisco. As general passenger agent, he will continue to have headquarters at that city.

John Hawkins Andrews, whose appointment to the position of assistant general freight agent of the Southern Railway, with headquarters at Mobile, has already been announced in these columns, has been in the service of the Southern Railway since 1897. He was born at Raleigh, N. C., March 9, 1876, and was educated at Raleigh Male Academy and the University of North Carolina, graduating from the latter in 1897. He entered the service of the Southern Railway on June 9, 1897, as an office boy in the division freight agent's office at Raleigh, N. C. He gradually worked his way up in that office to chief clerk, and on July 1, 1903, was made traveling freight agent. He was transferred to Greensboro, N. C., December 15, 1904, and returned to Raleigh in 1908. On September 1, 1911, he became commercial agent at Raleigh and was appointed division freight agent on November 15, 1912. He held this last named position until August 1, 1916, when he was promoted to assistant general freight agent at Mobile, as above noted.

Engineering and Rolling Stock

John L. Smith, Jr., has been appointed master mechanic of the Pittsburg & Shawmut with office at Brookville, Pa. George K. Russell has been appointed general storekeeper with office at Kittanning, Pa.

OBITUARY

C. W. Colby, manager Pacific Coast traffic of the Erie with headquarters at San Francisco, Cal., died at his home in that city July 29.

John M. Thurston, who was general solicitor for the Union Pacific from 1889 to 1895, and who afterward became United States senator, died at his home in Omaha, Neb. on August 9, age 69.

CANADIAN PIG IRON.—The production of pig iron in Canada in 1915 totaled 825,420 tons, of which Ontario produced 450,174 tons and Nova Scotia, 375,246 tons. The production in the first six months of 1916 was 507,750 tons.

"GOING AFTER BUSINESS."—Every day finds new evidences of loyalty and interest in the welfare of the company. And it is not such a hard job after all: The young lady stenographer buys her finery at Smith, Jones & Company and hears that they are about to enlarge their store. She sees Mr. Smith and says: "I am glad to hear of your plans for handling a larger stock. Now Mr. Smith, when you get your new fixtures won't you please route them over the Southern Pacific Lines? I would appreciate your patronage in return for that which I and my sisters give you; our service is the best, and we love reciprocity." A little talk along this line and the routing is secured.—*Southern Pacific Bulletin.*

Equipment and Supplies

LOCOMOTIVES

THE NEVADA CONSOLIDATED COPPER COMPANY, New York, has ordered two 0-6-2 type locomotives from the Baldwin Locomotive Works.

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for a second-hand, standard gage Shay locomotive.

THE MOGYANA RAILWAY, Brazil, has ordered 3 Pacific type locomotives from the American Locomotive Company. These locomotives will have 17½ by 20-in. cylinders, 45-in. driving wheels, a total weight in working order of 118,000 lb., and will be equipped with superheaters.

THE BRADEN COPPER COMPANY, 165 Broadway, New York, has ordered 2 four-wheel tank locomotives from the American Locomotive Company. These locomotives will have 11 by 16-in. cylinders, 33-in. driving wheels, and a total weight in working order of 39,000 lb. The engines are for use in Chile.

THE BINGHAM & GARFIELD, reported in last week's issue as being about to purchase a Mallet type locomotive, has ordered one superheater 0-8-8-0 Mallet type locomotive from the American Locomotive Company. This locomotive will have 26 and 41 by 28-in. cylinders, 51-in. driving wheels, and a total weight in working order of 461,000 lb.

PASSENGER CARS

THE LEHIGH VALLEY is in the market for 25 60-ft. baggage and express cars.

THE HAVANA CENTRAL recently ordered 3 third-class coaches and 5 combination baggage and mail cars from the Wason Manufacturing Company; 7 motor coaches from the American Car & Foundry Company, and one semi-convertible car from the J. G. Brill Company.

FREIGHT CARS

THE KANSAS CITY SOUTHERN is inquiring for 1,900 freight cars.

THE ATLANTIC COAST LINE is in the market for 100 underframes.

THE ILLINOIS CENTRAL is about to order 500 refrigerator and 700 box cars.

THE BETHLEHEM STEEL COMPANY has issued inquiries for 20 50-ton hopper cars.

THE ST. LOUIS & SAN FRANCISCO is inquiring for 500 36-ft. and 500 40-ft. box and 1,000 hopper cars.

THE MICHIGAN CENTRAL has ordered 500 center constructions from the Pressed Steel Car Company.

JOHN J. MCPHERSON, Kansas City, Mo., has ordered 10 50-ton tank cars from the American Car & Foundry Company.

THE NEW ORLEANS & NORTHEASTERN has ordered 100 30-ton box car bodies from the American Car & Foundry Company.

THE PIERCE OIL CORPORATION, St. Louis, Mo., has ordered 50 50-ton tank cars from the American Car & Foundry Company.

THE EAST JERSEY RAILROAD & TERMINAL COMPANY has ordered 20 40-ton tank cars from the American Car & Foundry Company.

THE WILHOIT REFINING COMPANY, Springfield, Mo., has ordered 10 50-ton tank cars from the American Car & Foundry Company.

THE MILLER PETROLEUM REFINING COMPANY, Chanute, Kan., has ordered 5 50-ton and 10 40-ton tank cars from the American Car & Foundry Company.

THE NEW YORK CENTRAL has ordered 1,000 box cars from the Haskell & Barker Car Company for the Lake Erie & Western and 1,000 box cars from the American Car & Foundry Company for the New York Central itself.

THE NEW YORK, CHICAGO & ST. LOUIS has ordered 500 underframes for reinforcing wooden box cars from the Illinois Car & Manufacturing Company and 500 underframes for reinforcing gondola cars from the Ryan Car Company. It may also buy 1,000 new cars.

IRON AND STEEL

THE HAVANA CENTRAL has placed orders for 5,000 tons of rails.

THE CUBA RAILROAD has ordered 350 to 400 tons of bridge work from Milliken Brothers, Inc.

THE PHILADELPHIA & READING has ordered 180 tons of bridge work from the McClintic Marshall Company.

THE PENNSYLVANIA RAILROAD recently received bids on 1,000 to 1,200 tons of steel for a freight house and bridge work at Connellsville, Pa.

The Chicago, Milwaukee & St. Paul has ordered one 85-ft. 155 ton double track girder span from the Wisconsin Bridge & Iron Company. It has also ordered two 108-ft. pony truss spans from the Fort Pitt Bridge Works for a bridge at McGregor, Ia.

MISCELLANEOUS

THE MICHIGAN CENTRAL is in the market for bridge stringers.

THE MINNEAPOLIS & ST. LOUIS is inquiring for eight carloads of bridge stringers.

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE is in the market for about 400,000 ft. of bridge stringers and timbers.

THE ATCHISON, TOPEKA & SANTA FE is inquiring for about 2,500 bridge stringers.

THE ALASKAN RAILWAY COMMISSION has given orders to the Seattle Car & Foundry Company for about $12,000 worth of clamps, blocks, forgings and other material to be used in constructing the government railroad in Alaska.

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for the following second-hand equipment: two standard gage locomotive cranes of 5 to 10 tons capacity; one 14-ft. gage locomotive crane, any capacity; one standard gage Ohio locomotive crane, Model D, 8-wheel type, 20 tons capacity and one 15-ton standard gage locomotive crane with 40 ft. boom and preferably 8 wheels.

THE CEMENT-GUN CONSTRUCTION COMPANY, Chicago, reports that it is now engaged upon the following railroad work: Lining two tunnels for the Northern Pacific in Montana; lining a tunnel for the Illinois Central near Unionville, Ind., protecting the steel work on the New York, Chicago & St. Louis bridge at Seventy-ninth street, Chicago, where the railway crosses over the Illinois Central, and covering the entire head-house, total approximately 200,000 sq. ft., for the Chicago & North Western grain elevator at South Chicago with 2-in. reinforced Gun-crete siding.

THE SPANISH COAL AND IRON TRADE.—The Spanish coal output in 1914 amounted to 3,905,080 metric tons, of which 2,457,613 tons proceeded from the province of Oviedo. The lignite yield was 291,057 tons. The iron ore output reached a total of 6,819,964 tons, or a falling-off of 3,000,000 tons, compared with the yield for 1913. The greatest yield was obtained from the province of Vizcaya with 2,618,150 tons, followed by Santander and Almeria with about 1,000,000 tons each. The output of manganese ore in 1913 was over 21,000 tons, and in 1914 just over 13,000 tons, in which the province of Huelva contributed 9,375 tons. In 1914 Spain produced 382,044 tons of pig-iron and 330,000 tons of iron and steel. The men employed in iron and steel works numbered 24,500 in 1914, while the plant comprised 21 blast-furnaces, 38 puddling furnaces, 27 open-hearth furnaces and 7 converters.

Supply Trade News

E. W. Richey has been appointed assistant to the president of the Standard Forgings Company, with office at Chicago, Ill.

The Ellcon Company, 50 Church street, New York, announces that the appointment of Wm. M. Wampler as eastern sales manager of the Acme Supply Company, Chicago, as announced in last week's issue, will in no way affect Mr. Wampler's interest and activity as vice president and general manager of the Ellcon Company.

W. Sharon Humes, formerly employed in the motive power department of the Pennsylvania at Altoona, Pa., and later sales manager of the General Railway Supply Company at Chicago for a period of six years, has become associated with the Hewitt Company, Chicago, in the manufacture and sale of anti-friction metals and locomotive packing.

Frank J. Engel, recently with the Boston & Albany, and Herman P. Hevenor, recently with the New York, New Haven & Hartford, and previously with the Brooklyn Rapid Transit, have formed a copartnership for carrying on an engineering and contracting business under the firm name of Engel & Hevenor, with offices at 220 Broadway, New York.

Thornton Hopkins, connected with the Beckwith-Chandler Company, New York, manufacturers of high grade varnishes for many years as a representative in the railway department, and subsequently as assistant secretary, died at his home in Brooklyn, N. Y., July 31. Mr. Hopkins was for several years a clerk in the employ of C. T. Raynolds, and when that firm was consolidated under the name of Devoe & Raynolds continued in its employ. In 1906 he severed his connection and subsequently accepted a position with the Beckwith-Chandler Company, and remained with them until his death, although for the past year or more he had been incapacitated from active duties on account of ill health.

John P. Risque, superintendent of locomotives and cars for the Cuba Cane Sugar Corporation at Havana, Cuba, writes that his company would like to receive catalogues of railway equipment and supplies. The company's lines carry cane principally, and do little passenger business. The railway organization is under the direction of the department of railways and lands of which A. Ximeno is engineer in chief, with headquarters at Obispo, 59, Havana. All catalogues pertaining to maintenance, etc., should be addressed to him. Catalogues dealing with car and locomotive specialties, shop equipment, tools, etc., should be addressed to Mr. Risque at the same address. E. L. Ragonnet (inventor of the reverse gear by that name) is mechanical engineer of the company.

G. A. Trube has been appointed export manager of the Westinghouse Air Brake Company and the Westinghouse Traction Brake Company, effective August 1, 1916, with headquarters at Pittsburgh, Pa. Mr. Trube has had a wide foreign experience, having been associated with the Westinghouse Air Brake and Westinghouse Electric interests for many years, both in this country and abroad. He went to England in 1900 to carry out some special work, and soon afterwards made his headquarters there. In January, 1912, he was transferred to Paris to become managing director of the French Westinghouse Company, which position he has now resigned in order to return to this country and take up his new duties here.

Thomas J. Drummond, president of the Lake Superior Corporation, the Canadian Iron Corporation, and the Algoma Steel Corporation, Ltd., died suddenly at his summer home in Castine, Me., Sunday, August 6. Mr. Drummond had been very prominent in iron and steel manufacture in Canada for many years. He was born in Tawley, Ireland, September 26, 1860, and received his education in the public schools of Montreal. In 1882 he became a partner in the firm of Drummond, McCall & Co., of Montreal, manufacturers of iron and steel. While with this company he aided in the founding of the Montreal Car Wheel Company, the Canadian Iron Furnace Company, the Radnor Forges and the Drummond-McCall Pipe Foundry. Mr. Drummond was also president of the Algoma Central Railway and held directorships in the Canadian Car & Foundry Company, the Cockshutt Plow Company and the American Iron and Steel Institute.

T. F. Flanagan, whose appointment as general sales and advertising manager of the Pyrene Manufacturing Company, New York, has already been announced in these columns, is only 25 years of age. He was educated at Trinity College in Hartford, where he was active in the management of both the college magazine and newspaper. During the same time he worked nights as a reporter on the Hartford Courant, and during the summer did police reporting. Following his graduation, Mr. Flanagan went to New York and became associated with the Wales Advertising Agency, which he left to become advertising manager of the C. J. Tagliabue Manufacturing Company, in Brooklyn. In that company, he worked rapidly into the sales department where he directed the work of about 20 salesmen and where he remained until 14 months ago when he joined the Pyrene Manufacturing Company as assistant advertising manager. Soon after he joined the Pyrene forces, he became assistant to C. Louis Allen, now the company's president but then its sales manager, and when Mr. Allen's promotion left the position of head of the sales force vacant the work devolved on Mr. Flanagan. Now he has been given the title of general sales and advertising manager as above noted.

T. F. Flanagan

American Locomotive Company

It sounds striking enough to say that the American Locomotive Company's fiscal years ending June 30, 1915, and June 30, 1916, were respectively the worst and the best in the company's 15 years of business. When one reads in the annual report, however, that the net profits were 69 per cent greater than those of the best previous year, one begins to realize the extent to which the company has benefited by the revival of business conditions and its activity in the manufacture of munitions of war.

The gross earnings of the American Locomotive Company and the Montreal Locomotive Works, Ltd., in the year just closed were $59,316,016 as compared with only $9,303,298 in 1915, a difference of over $50,000,000. These gross earnings were the largest in the company's history, the best previous gross earnings having totaled $54,868,000 in 1913. The net profits after the deduction of manufacturing, maintenance and administrative expenses and depreciation, including cost of equipment for ammunition orders, and deductions for interest, etc., on bonds of constitutional companies, etc., were $10,769,429. This compared with a deficit in 1914-15 of $1,491,980, and was $4,411,222 or 69 per cent greater than the net profits of $6,358,207 made in 1906-07, the best previous year. The report says that, "This good showing was due to the successful execution of the company's munitions orders." It does not say how much was made on the war orders, but it will be remembered that the company was reported May, 1915, as having received orders from the Russian government for $65,000,000 of shells, half of which it sublet to the Westinghouse and New York Air Brake Companies. The report says further: "In arriving at the profit of $10,769,429 there has been deducted from earnings the sum of $1,761,682 for depreciation on all classes of property. There has also been charged against the profits for the year the entire cost of all new equipment of every description purchased for use on munitions work, together with the cost of alterations of plants in connection with such work. In addition to the foregoing a sufficient amount has been set aside from this year's earnings to

provide for the cost of eventually restoring the two plants now making munitions to the best conditions for locomotive work when it is resumed at such plants."

Dividends of 7 per cent, totaling $1,750,000, were paid on the preferred stock and a reserve for additions and betterments of $3,000,000 established, so that the credit to profit and loss was $6,019,429. This compared with a debit of $3,241,980 in 1915, but in 1915 the dividends on the preferred stock, also amounting to 7 per cent, were paid out of surplus.

The amount of unfilled locomotive orders on the books on June 30, 1916, was $19,376,532 as compared with $5,838,235 on June 30, 1915. Practically all of the munitions orders which were on hand at the beginning of the year have been completed and shipped. The unfilled munitions orders on the books on June 30, 1916, together with the munitions orders taken since, amount to $41,642,905.

The combined balance sheet for the American Locomotive Company and the Montreal Locomotive Works, Ltd., on June 30, was as follows:

Assets		
Cost of property (less depreciation reserves)		$48,530,258
Securities owned		705,750
Convertible assets—		
Cash assets	$10,351,071	
Accounts collectible	11,769,379	
Bills receivable	900,307	
Accrued interest	1,704	
Material and supplies	5,899,020	
Contract work in course of construction	6,698,488	
Locomotives and snow plows in stock	141,725	
		35,761,694
Sundry deferred charges		72,341
		$85,070,043
Liabilities		
Capital stock—		
Preferred	$25,000,000	
Common	25,000,000	
		$50,000,000
Bonded debt of constituent companies		1,932,000
Current liabilities—		
Gold notes outstanding	$2,722,000	
Accounts payable	11,018,725	
Income tax withheld at source	1,058	
Accrued interest	94,530	
Unclaimed interest	5,802	
Dividends on preferred stock payable July 21, 1916	437,500	
		14,279,615
Reserve for United States income and Canadian war taxes, restoration of plants, etc.		1,857,175
Reserve for additions and betterments		3,035,563
Profit and loss—		
Balance June 30, 1915	$8,293,678	
Add—Surplus for year	6,019,429	
	$14,313,107	
Add—Unexpended balance in "Reserve for loss in liquidation of auto business," now restored to surplus	453,325	
	$14,766,432	
Deduct—Estimated property loss due to retirement and eventual disposition of Rogers and Manchester plants	800,742	
Surplus, June 30, 1916		13,965,690
		$85,070,043

New York Air Brake Company

The New York Air Brake Company has declared a quarterly dividend of 2½ per cent. The company paid dividends of 6 per cent in 1896 and 8 per cent annually from October, 1899, to October, 1907. Dividends were not resumed until 1910, when the stock was placed on a 6 per cent basis. Last March the dividend was increased to 2 per cent quarterly, and this was continued at the June meeting.

In announcing the increased dividend, President Starbuck said in part:

"It is expected that this will be the regular dividend rate in the future.

"The company earned for the past six months of the year in excess of $5,000,000 after amortizing all its new equipments.

"The company's financial position is exceptionally firm, as its total liabilities are less than $30,000, and it has more than $3,500,000 cash deposits in bank and upwards of $4,000,000 due on delivered orders.

"Since the last monthly meeting the company has closed a contract for 600,000 fuses, which was duly announced. In addition to this, the company has just closed a contract for 2,500,000 cartridge cases, which contract runs until March 31, 1917.

"The directors deem it wise not to make any distribution of the munition profits at this time, as the company is still bidding for additional war orders, and its present firm financial position will enable it to fill any further orders without borrowing."

Railway Construction

Atchison, Topeka & Santa Fe.—This company has filed articles of incorporation for the building of a line 70 miles southwest of Lubbock, Tex., to a point near Seminole, Tex.

Cleveland, Southwestern & Columbus (Electric).—This company planned to award contracts on August 9, for the construction of a cutoff between the north and south corporation line of the village of Berea, Ohio, three miles outside of the village limits. The cutoff will shorten the railroad one-half of a mile. The work involves the construction of three bridges, two of which will be of concrete construction, 50 ft. in length, and one of steel construction, 150 ft. in length. The maximum grade is about two per cent. F. T. Pomeroy, member of the executive committee, 525 Garfield building, Cleveland, Ohio.

Lehigh & New England.—This company is constructing second track between Greenwood street, Tamaqua, Pa., and Seek and has awarded a contract for the grading work to F. H. Clement & Co., of Philadelphia.

Mexican Roads.—According to a Texas correspondent the de facto government of Mexico has placed orders for materials for the construction of more than 1,200 miles of new railway and for the rehabilitation of the National Railways of Mexico, now known as the Constitutionalist Railways of Mexico. The proposed work includes the resumption of the construction of a line between Campeche, in the state of Campeche, and Santa Lucrecia, in the state of Vera Cruz, 450 miles, previously projected by a British syndicate; a line from Durango to Concepcion del Oro, 250 miles; a railroad from Ameca, Jalisco, to the Pacific port of Chamela, 150 miles; a road from Saltillo, Coahuila, to Oreaga, 100 miles; a line from Allende, Coahuila, to Las Vacas, opposite Del Rio, Tex., 75 miles; another from Tampico, Tamaulipas, to Matamoros, 315 miles.

Mobile & West Alabama.—Lewis A. May, of Norwood, Birmingham, Ala., is credited with saying that a British syndicate is ready to take up the proposed building of this road, charter for which was granted in 1893, as soon as financial conditions permit. The route surveyed is from Florence via Tuscaloosa to Mobile, 350 miles, with a branch to Birmingham, 30 miles, making a total of 380 miles of line to be built. The maximum grade would be about one-half of 1 per cent. The charter for the road was granted in 1893, the incorporators including Governor Thomas Seay, Huriosco Austill and J. L. Rapier, of Mobile; L. B. Musgrove, of Jasper, Ala.; J. W. Whiting, of Mobile; Howard Douglass, R. C. McCalla and others. It has been kept alive and rights of way granted and station sites are still, it is said, held in the name of the company It is estimated that the line would cost about $20,000,000 to build. Jere H. Austill, of Mobile, Ala., son of Huriosco Austill, is also interested.

New York Subways.—The contract for the installation of tracks in the Broadway-Fourth avenue subway system in Manhattan and Brooklyn, from Fifty-ninth street and Seventh avenue to the Flatbush Avenue Extension in Brooklyn, has been awarded by the Public Service Commission, First district, to the T. H. Reynolds Contracting Company, Inc., the lowest bidder, for $288,400. The board of estimate and apportionment will be asked to approve this contract as soon as possible, so that the work may be gotten under way without delay.

Northern Montour Railroad.—A company by this name has applied to the Pennsylvania Public Service Commission for approval of incorporation. The company proposes to build a line about 35 miles long from a point on the Montour Railroad in Robinson township, Washington county, to a point about one mile from Smiths Ferry, in Ohio township, Beaver county, Pa. Protest has been entered against the approval of this incorporation. The initial hearing has been held, but no action has yet been taken by the commission.

Northern Pacific.—This company has awarded a contract for the grading of a branch line from Dixon, Mont., to Polson, 33.75 miles, to Siems, Wickham & Co., St. Paul, Minn. (July 14, page 90.)

SEABOARD AIR LINE.—This company, as part of a plan to establish a low grade line from Hamlet, N. C., to Savannah, Ga., via Charleston, has awarded a contract to the Vaughan Construction Company, Shawsville, Va., for grade revision work on a portion of the 10 miles between Hamlet and Gibson, N. C. The work will be begun as soon as possible and will be in charge of H. S. Thomas, engineer-in-charge at Hamlet, N. C.

RAILWAY STRUCTURES

BALTIMORE, MD.—The Pennsylvania Railroad received bids August 14 for a passenger station near Edmondson avenue. The station will be a one-story structure 70 ft. by 25 ft. in size, and will cost about $25,000.

BRANDON, VT.—The Central Vermont will erect by company forces a three span reinforced concrete bridge, costing about $21,000, over a highway at present crossing the tracks at grade.

HARRISBURG, PA.—The Pennsylvania Railroad has awarded to Warren, Moore & Co., of Philadelphia, the contract for two freight houses at Harrisburg, to cost about $350,000. Both buildings will be of reinforced concrete, the inbound house being 44 by 50 ft. and four stories high, the outbound 470 by 20 ft. and one story high.

JACKSONVILLE, FLA.—The Jacksonville Terminal Company has decided upon designs for a new union passenger station and has selected Kenneth M. Murchison, 101 Park avenue, New York, as architect. The terminal will be on Lee street at West Bay street and will cost about $1,000,000. Grading and track work for the station will be begun during September and will be completed during the winter. The station itself will not be begun until after the close of the tourist season. J. E. Willoughby, chief engineer of the Atlantic Coast Line at Wilmington, N. C. is chairman of the committee of engineers.

JOHNSON CITY, N. Y.—The Erie will build a concrete and steel bridge to carry Lester avenue over its tracks. The bridge will have two 29-ft. spans and one 96-ft. span. The steel will be taken from an old bridge. The Robert Grace Contracting Company, Pittsburgh, Pa., has the contract for the foundation; the remainder of the work will be carried out by company forces. The total cost is about $18,000.

NEW ORLEANS, LA.—Architects are preparing plans, it is said, for a new steel and brick passenger station for the Louisiana Railway & Navigation Company in New Orleans. The station will be on Rampart street, between Firard and Julia streets. Improvements in freight facilities will also be made, the total cost of the passenger and freight terminal improvements being estimated at between $350,000 and $500,000.

SAVANNAH, GA.—The Midland Railway will erect a two-story brick passenger station 50 ft. by 84 ft. in size. The building will have a tile roof, and will be steam heated. Its second floor will be used for offices. It will also build a freight station 50 by 450 ft. in size. The cost will be about $25,000. Construction will be done by company forces.

SOUTH BELOIT, ILL.—The Chicago, Milwaukee & St. Paul will make terminal improvements at this point costing about $65,000.

TULSA, OKLA.—The Midland Valley has awarded a contract to the Manhattan Construction Company for the erection of a one-story passenger station, 30 ft. by 180 ft. The structure will cost about $25,000 and will be of concrete construction. Work is now under way. Charles Kaighn, chief engineer, Muskogee, Okla.

TWO HARBORS, MINN.—The Duluth & Iron Range has commenced the construction of a new car repair shop, one story high, 275 ft. wide and 298 ft. long. The shop will be of mill building construction with steel frame, concrete block wall, concrete mastic floor and pitch and gravel roof. The Bowe-Burke Company, Inc., Duluth, Minn., has the general contract.

WASHINGTON, IND.—The Evansville & Indianapolis has let contracts to Standish & Allen, Chicago, Ill., for the reconstruction of a bridge over the White river and the erection of a new bridge over Doane's creek. The project involves 300 tons of steel, furnished by the American Bridge Company, about 1,500 cu. yd. of concrete and about 500 cu. yd. of excavation. Work is now under way.

Railway Financial News

BOSTON & MAINE.—The following is taken from a letter addressed by President Hustis, of the Boston & Maine, to W. H. McClintock, president of the Connecticut River Railroad, and B. A. Kimball, president of the Concord & Montreal:

The proposition which, it is understood, your committees are prepared to recommend to your respective boards is stated substantially as follows:

"The existing leases of the Concord & Montreal and the Connecticut River railroads be continued in force, with the exception that the future annual dividends of the Concord & Montreal shall be at the rate of 6 per cent upon its capital stock, instead of 7, and the future annual dividends of the Connecticut River Railroad upon its capital stock shall be at a rate correspondingly lower than the 10 per cent now stipulated in its lease."

You also state your belief that this proposition "will be acceptable to the directors and stockholders of their respective companies, and of greater advantage to the Boston & Maine, and all other interests concerned."

Your plan does not provide for a financial coördination of the properties which are under direct lease now comprising the system, and it therefore falls short of what is an essential in any reorganization—the principle of which is included in the amended plan submitted by your boards on June 17. It is the principle on which all interests have been working.

When it became apparent about three years ago that the Boston & Maine would fail to earn its fixed charges, the plan you now suggest was considered informally by some of the leased lines, and abandoned as unsound and failing to solve the fundamental difficulties, since, even if all the roads directly leased to the Boston & Maine reduced their rentals in the proportions now suggested by you, the fixed charges would still bear a much higher ratio to the average net of the last sixteen years than is regarded as safe by the investing public, and the Boston & Maine would still be without necessary credit. The proposed reduction, even if applied to all those roads now leased directly to the Boston & Maine, would reduce the annual fixed charges of the system less than $400,000, and would not appreciably affect the present ratio of net to fixed charges.

We are assured that the Boston & Lowell and the Fitchburg will not assent to a suggestion which will change their status, so as to make the Connecticut River and Concord & Montreal their creditors. It is also true that even if these two roads did assent to such a change it would be impracticable without further radical change in the proportion of income to fixed charges, to underwrite a subscription to new stock by Boston and Maine stockholders or obtain the further sums needed to fund the floating debt of the leased lines, and provide for improvements which have been already too long delayed.

The aim and effort has been to bring together all those properties under direct lease to the Boston & Maine because it was recognized from the beginning that it would be difficult to also bring in those properties not directly leased to the Boston & Maine.

Since the system assumed its present shape through the lease of the Fitchburg in 1900, there has been a constant growth of business, but little has been done to coördinate the facilities of the system to provide for economical handling of the business, two exceptions being the Billerica shops and the Mechanicville classification yard. Both of these developments were necessary and both have benefitted system operation. But there is no assurance that they will be needed under separate operation. The entire expense of the Billerica improvement, adjacent to the Boston & Lowell Railroad, and a substantial portion of the expense of the Mechanicville improvement, which is on Fitchburg property—the two running into millions of dollars—are still being carried in the Boston & Maine accounts, and represent part of the Boston & Maine's present indebtedness, because those roads have no assurance that these facilities would be needed for separate operation.

Other improvements equally important from the standpoint of the system as well as of the public are being deferred to the detriment of both.

Failure to develop the properties for system operation is to a much larger extent than is generally appreciated responsible for the situation that has existed, that now exists, and that will continue to exist until reorganization is accomplished. Improvements must be developed without reference to individual ownership. Equipment should be provided for system operation.

There is no charge that can be sustained that the system as a whole is overcapitalized, and it therefore should, and we have reason to believe will be allowed to earn reasonable returns on its combined capitalization. Abnormal conditions have prevailed during the year just closed and the financial showing is more favorable than we can reasonably expect in the future unless the railroad can be rehabilitated so that it may handle its present business with expedition and economy and provide for normal growth.

The floating debt has been reduced, but a large amount remains unpaid. The later renewals of the notes have been made possible by the action of the Boston & Lowell and the Fitchburg in accepting the principle of reorganization laid down in the plan, and by the hope that the other leased lines would also accept it. Provision must be made for the payment of the notes and for the cost of developing the railroad to the point where it can do its business efficiently.

The proposal you submit is not calculated to produce this result, and for the reasons stated the directors of the Boston & Maine find it impossible to accept your proposition. They recognize the gravity of the situation and urge most earnestly that your directors reconsider the matter to the end that without delay a consolidation be effected that will work a permanent cure of the fundamental of defects of the Boston & Maine system.

CANADIAN NORTHERN.—Wm. A. Read & Co., New York, and the Dominion Securities' Corporation, Toronto, have bought $1,250,000 5 per cent equipment trust certificates, series L, of the Canadian Northern. The equipment on which these certificates are secured cost $1,677,000.

CHICAGO, ROCK ISLAND & PACIFIC.—Theodore Prince, of the New York Stock Exchange firm of L. M. Prince & Co., has a long article in the August number of Moody's Magazine, which he calls Rock Island—Reorganization by Anaesthesia. The conclusion he reaches apparently is that it would be best for everyone concerned if a $50 per share assessment was to be made.

MISSOURI PACIFIC.—The Commercial & Financial Chronicle says that applications for participation in the syndicate formed by Kuhn, Loeb & Co., for the purpose of underwriting the $46,000,000 cash requirements of the reorganization plan are understood to aggregate approximately $76,000,000.

NEW YORK, NEW HAVEN & HARTFORD.—The following is taken from a statement sent out by the New York, New Haven & Hartford:

"All earnings are being put back into the road in order to bring it up to the necessities of the business requirements of New England. It will be necessary for the company to expend, within the next five or ten years, from $20,000,000 to $30,000,000 in order to equip the road with the necessary facilities, motive power, yards, terminals, station improvements, etc., to meet the growing requirements of New England. The floating debt of the company is $45,000,000, including $20,000,000 three-year collateral gold notes of The New England Navigation company maturing May 1, 1917.

"The New Haven has suffered serious disadvantage because of the lack of adequate motive power and terminal facilities.

"It is suffering from these drawbacks today and it will continue to suffer until the necessary funds with which to correct these drawbacks can be obtained. The management, thoroughly alive to the situation and familiar with the necessities of the company, ordered last fall 83 new locomotives of the biggest and most modern type. Some of these locomotives were to have been delivered early in the year, but the American Locomotive Company, like most other manufacturing concerns, has been choked with other domestic orders and overjammed with foreign business. Therefore there has been delay on the part of the American Locomotive Company in delivering most of these new locomotives to the New Haven, but word was received several days ago that deliveries would begin within a few weeks on the scale of three locomotives a week. With this new motive power in full operation on the main line, the locomotives now on the main line are to be transferred to branch lines, and in this way greater service can be given to the business interests of New England. All told, it is estimated that within the last two years it was necessary to condemn approximately 266 engines—66 on the New Haven and 200 on the Central New England.

"It is very frequently stated that most of the yard terminals on the New Haven were laid out when the company was doing 50 per cent less business than it is called upon to do today; and it is a prime essential that these terminals be improved as quickly as possible.

"The great business boom in New England started about a year ago. The New Haven then had many idle engines and many idle freight cars. Even as late as August 1, 1915, the New Haven had 200 engines in apple pie order, laid up on side-tracks with nothing to do. Then this business, this wonderful business, started. Within a month or two the New Haven was swamped with business. Because of the shortage of motive power President Elliott telegraphed to every railroad executive east of Chicago and Pittsburg in an effort to lease additional locomotives. He also telegraphed to Sir Thomas Shaughnessy of the Canadian Pacific, and, as a result, he was able to obtain only 23 additional engines.

"At one time there were 55,000 loaded freight cars on the New Haven's lines and from 10,000 to 13,000 on other lines waiting to come into New England over the New Haven's tracks. Not only was the New Haven swamped with business but most New England manufacturers found themselves in the same predicament. Many manufacturers were without adequate storage capacity, and their inability to promptly unload cars, together with the New Haven's lack of adequate motive and terminal facilities, led to the serious congestion on the New Haven's lines. This serious congestion was a severe detriment to the New Haven, for the reason that it led to heavy financial loss through demurrage charges. In other words, in order to accommodate the manufacturers, the New Haven was compelled to try to do a gallon of business with a quart of facilities.

"The congested conditions at the present time are somewhat better, not much. The New Haven has on its lines today 45,000 loaded freight cars, its complete capacity, and on other lines waiting to come in are 8,000 additional loaded cars. This state of affairs cannot be very much improved until the New Haven can find the money to increase its terminal facilities.

"President Elliott recently said: 'A low estimate of what the New Haven road should spend to be able to turn out a first-class article of transportation in New England territory is probably $30,000,000, more likely $50,000,000. I believe we are to increase our business. In the period from 1903 to 1914 the transportation output of the New Haven increased between 40 and 44 per cent, and it is going to increase in the next ten or twelve years an additional 30 per cent to 40 per cent. All transportation agencies must be able to increase their facilities; but it is going to take money and it cannot be done simply by one railway improving its facilities, because a chain is no stronger than its weakest link. If we should improve our lines, and the New York Central and the Pennsylvania were blocked, it would not help very much, or, if they improved their lines and we did not improve ours, it would not help very much.'

"The New Haven, like all other railroads in the country, has been compelled to pay from 100 per cent to 700 per cent more for railroad materials. In addition, it is confronted with the demands of the four big railroad brotherhoods for an eight-hour day at pay for what is practically now a ten-hour day. These demands of the four big railroad brotherhoods would represent an additionnal expense to the New Haven of about $2,000,000 a year. These brotherhoods represent 18 per cent of the total number of railway employes; they now receive 28 per cent of the total railway payrolls."

WABASH-PITTSBURGH TERMINAL.—This property was sold under foreclosure on Augsut 15 to the reorganization committee for $3,000,000.